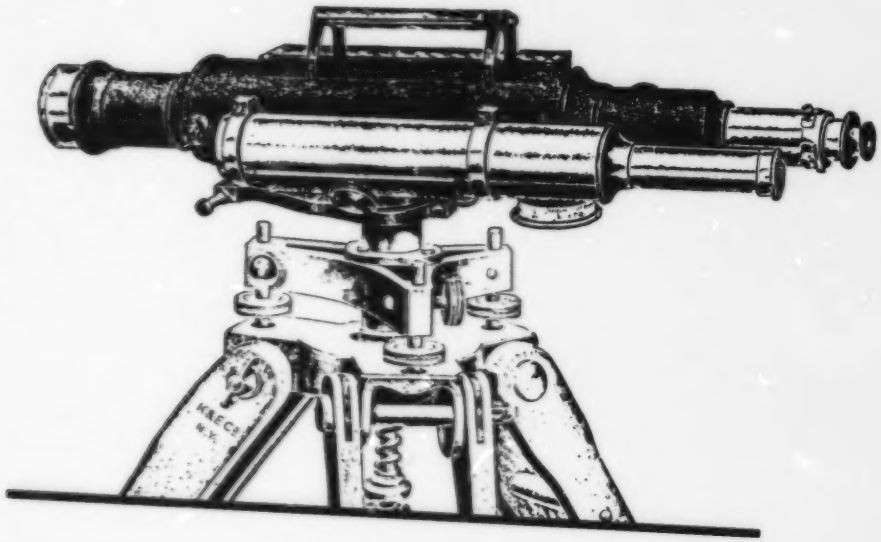
Crown Lands:

A history of Survey Systems



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CROWN LANDS:

A History of Survey Systems

W. A. Taylor, B.C.L.S.

1975

Surveyor General Branch
Ministry of Crown Lands
Victoria
British Columbia

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1st Reprint, 1981

To those in the Provincial Archives who have willingly supplied information,

To those others who, knowingly and unknowingly, have contributed useful data, and help,

and

To the curious and interested who wonder why things were done as they were.

W. A. Taylor, B.C.L.S.
1975

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Evolution of Survey Systems in British Columbia

Prior to the signing of the Oregon Boundary Treaty on June 15, 1846 the whole of the area between the Russian Possessions in the North, the Mexican or California territory in the south, the Rocky Mountains in the east and the Pacific Ocean, was disputed territory. (1) Vancouver Island was part of this disputed territory.

Great Britain and the United States had agreed in 1818 that the whole of this Oregon territory was free and open to citizens of both countries. However, neither country was above taking some action to firm up their claims and in 1838 the Hudson's Bay Company was granted by Charles the Second a 21 year exclusive trading and hunting licence on the north-west coast of America with temporary and possessory title of the land for that period. Subsequently, in 1843 the Company erected a Fur Trading Post at Victoria and began laying out boundaries of land required, as protection from intrusion by American citizens. (2) There is nothing like a little surveying to create the illusion of ownership.

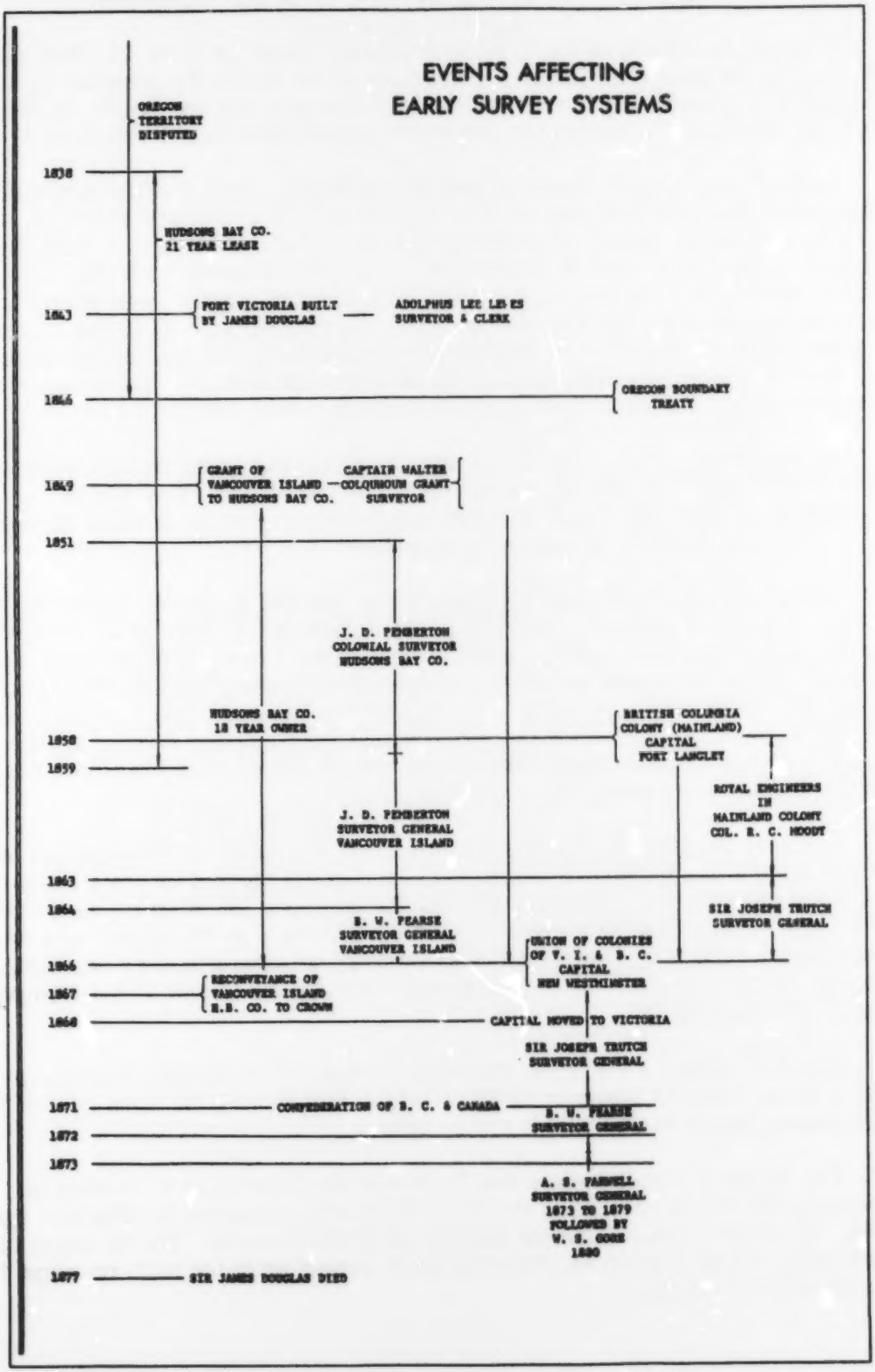
By the Oregon Boundary Treaty, the Crown obtained undisputed sovereignty to land north of the 49th parallel, as well as the whole of Vancouver Island. Ownership of San Juan Island however remained disputed for another 25 years until 1872 when it was finally judged to be American.

Title to the whole of Vancouver Island was granted by Royal letters Patent of Queen Victoria on January 13, 1849 to the Hudson's Bay Company. Included were certain conditions, one of which was the right of the Crown to re-purchase the Island from the Company on the termination of the trading licence which would expire May 30th, 1859. An apparent policy of the Hudson's Bay Company was to recognize claims by the native peoples, despite the Company holding title from the Crown. James Douglas made settlements with the tribes from Victoria to Sooke and on the Saanich Peninsula.(3)

On June 29, 1860 the Colony and the Company made an arrangement whereby all the lands in the Colony of Vancouver Island could be sold by the Colony except the lands held for, and previously sold by the company (all of which were specified). The actual conveyance of the Island from the Company to the Crown was seven years later on the 3rd of April 1867 and validated all sales made by the company prior to January 1, 1862. The consideration paid by the Crown to the Company was 57,500 pounds.(4)

Joseph Despard Pemberton, Colonial Surveyor of the Colony (Vancouver Island had obtained colonial status in 1849) arrived at Fort Victoria on June 24, 1851 and immediately began to consider a survey system.

It is apparent from his diary that he had in his possession a Treatise on Surveying by Captain Frome of the Royal Engineers published in 1839 and again in 1850. Frome had been Surveyor General of South Australia. The following quote form page 123 of Captain Frome's treatise is copied word for word on page 17 of Mr. Pemberton's diary.(7)


EVENTS AFFECTING
EARLY SURVEY SYSTEMS
OREGON TERRITORY DISPUTED
1838
HUDSONS BAY CO. 21 YEAR LEASE
1843
FORT VICTORIA BUILT BY JAMES DOUGLAS
ADOLPHUS LEE LEWES SURVEYOR & CLERK
1846
OREGON BOUNDARY TREATY
1849
GRANT OF VANCOUVER ISLAND TO HUDSONS BAY CO.
CAPTAIN WALTER COLQUHOUN GRANT SURVEYOR
1851
J. D. PEMBERTON COLONIAL SURVEYOR HUDSONS BAY CO.
HUDSONS BAY CO. 10 YEAR OWNER
1858
1859
BRITISH COLUMBIA COLONY (MAINLAND) CAPITAL FORT LANGLEY
ROYAL ENGINEERS IN MAINLAND COLONY COL. R. C. MOODY
J. D. PEMBERTON SURVEYOR GENERAL VANCOUVER ISLAND
1863
1864
SIR JOSEPH TRUTCH SURVEYOR GENERAL
B. W. PEARSE SURVEYOR GENERAL VANCOUVER ISLAND
1866
UNION OF COLONIES OF V. I. & B. C. CAPITAL NEW WESTMINSTER
1867
RECONVEYANCE OF VANCOUVER ISLAND H.B. CO. TO CROWN
1868
CAPITAL MOVED TO VICTORIA
SIR JOSEPH TRUTCH SURVEYOR GENERAL
1871
CONFEDERATION OF B. C. & CANADA
B. W. PEARSE SURVEYOR GENERAL
1872
1873
A. S. FARWELL SURVEYOR GENERAL 1873 TO 1879 FOLLOWED BY W. S. GORE 1880
1877
SIR JAMES DOUGLAS DIED

"Sections laid out with frontages upon main lines of road, rivers, or where ever increased value is thereby conferred upon the land, should have their frontages reduced to one-half, or even one third of the depth of the section, so as to distribute this advantage among as many as can participate in it without rendering the different sections too elongated in figure to be advantageously cultivated as a farm."

This treatise has a very comprehensive chapter on Colonial surveying and makes strong recommendation that before cadastral surveys are begun they must be preceded by a trigonometric survey of the area, laying out of roads, classification of land and selection of a townsite. Squaring and marking of corner posts is dealt with and trenching is suggested. An illustration is given as Plate 3 showing the split-line method of booking field notes, which has been used by most surveyors in this Province ever since.

Mr. Pemberton was also aware of the rectangle rigid system adopted prior to 1840 in New Zealand by Captain Dawson and the less rigid modified rectangular form adopted in surveys for the Canterbury Settlement (1849) by Captain Thomas, chief surveyor for the Canterbury Association which established Christchurch N.Z. as its headquarters. He also refers in his diary to the section system, 640 acres divided into quarter sections in vogue in the United Sates.(8).

The adoption of any survey system should take into consideration access, present and future, potential isolation of settlers and cost of survey. A rectangular grid system such as the Dominion Township Grid system of 160 acre quarter sections with road allowances, is the cheapest method of producing the most surveyed acres in the shortest time. However, it has been proven to have had a marked effect on the cultural and psychological development of the settlers.

Settlers generally arrive too quickly for adequate surveys to precede them and the Township system was a desperate move to fill the blank of surveyed land available for purchase.

Despite Mr. Pemberton's awareness of these proven colonial survey systems he still apparently overlooked the necessity to provide for future roads. Even in the Canterbury Settlement to which he made frequent reference, the Association reserved for itself the right to appropriate land for future bye and cross roads (9).

The Hudson's Bay Company grants as a result of the first surveys did not give the Company or the Crown any right of resumption for road making and neither did the Colonial Grants. It was not until the Land Ordinance of 1870 specified a form of Crown Grant, that the Crown reserved the right to resume ownership of 1/20 of a grant for building of public roads. This has been the basis of all survey systems in British Columbia since, including the Township systems which did not provide for road allowances along the boundaries.

The Colonial Surveyor of Vancouver Island had the difficult task of deciding which system was most suitable to the country. The results of his cogitations show up for example in the survey patterns around Victoria, Metchosin and Sooke Districts which show the strong influence of Captain Frome's recommendations. These patterns bear a striking resemblance to surveys carried out for the Canterbury Settlement only a year or two before.(9).

First System 1851 - Hudson's Bay Company Sections
(See Plate 1.)

The favoured system was the laying out of allotments to settlers on a more or less rectangular system (at least some attention was paid to a degree of parallelism) with very little regard or intention to run the boundaries to Cardinal Points of the compass. The allotments were surveyed as isolated parcels but were tied trigonometrically and when intervening allotments filled in the spaces between, a very kaleidoscopic pattern resulted. Acreages of these allotments, later to be known as Sections varied between 12 and 840 acres, with no two sections of the same acreage. Mr. Pemberton strongly recommended against a rigid adherence to cardinal directions for boundaries, as did Captain Frome.

The first surveys on record leading to title were made of lands sold by the Hudson's Bay Company and there was no similarity of shape to any of them. They were made on a point to point basis establishing corners A, B, C, D, etc., there are no field notes but plans were drawn at scales of either 6 inches or 4 inches to the mile but undimensioned as to distance or bearing. These plans are attached to the Grants which contain a metes and bounds description. Distances in descriptions are in links and the areas are given in statute acres and roods.(5) Corners are usually described being marked with a post *"pottery under"* or a post *"beneath which a piece of pottery is placed supported by a stone"*. The first Hudson's Bay survey and title document is dated December 15, 1851.(6)

This system may have lasted only as long as Pemberton was Colonial Surveyor, for the Hudson's Bay Company (1851 - 1858). Surveys with boundaries to cardinal direction were made thereafter.

Second System 1858 - Sections and Ranges - Vancouver Island
(See Plate 2.)

During 1858 - 60 surveys were pushed ahead on Vancouver Island, due to an influx of thousands of miners from California, and some 175,000 acres were divided into Sections, each lot generally containing 100 acres. The measurements were uniquely, 20 chains X 50 chains.(10). In some instances numerous contiguous Sections were surveyed in a parallel system with the longer sides of the sections at right angles to the general trend of a trunk road. In one area (Metchosin) the axis of the system was magnetic north because this direction more nearly fitted the

PLATE I

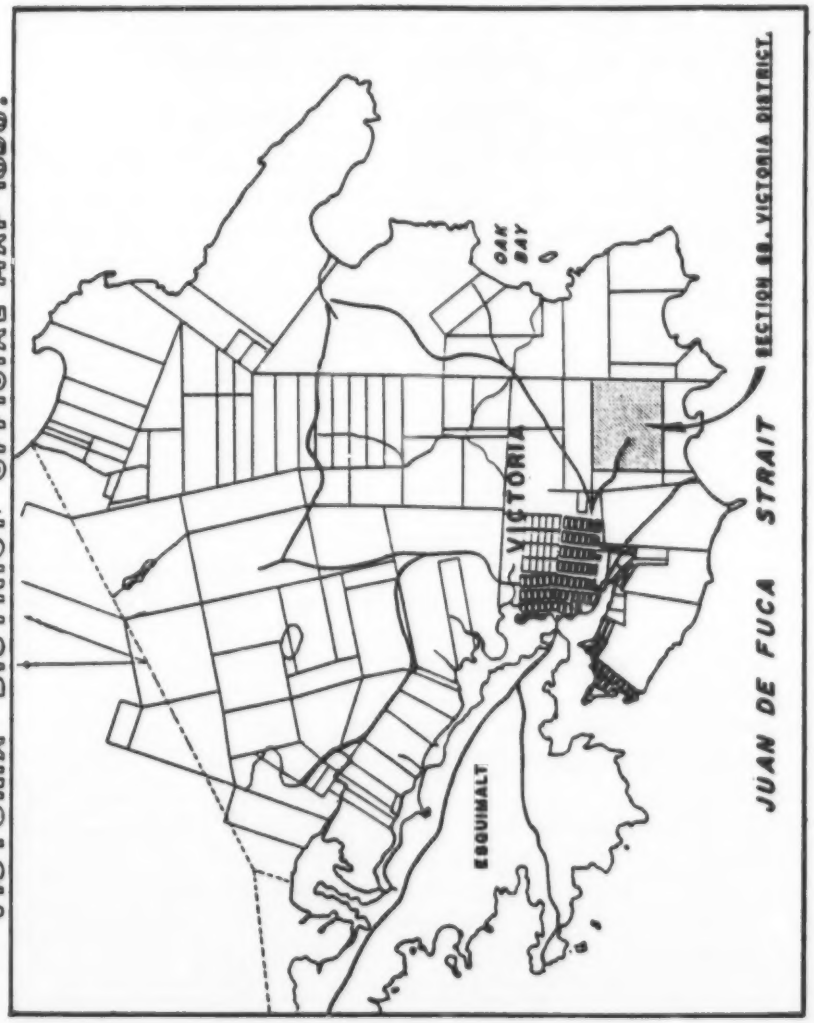
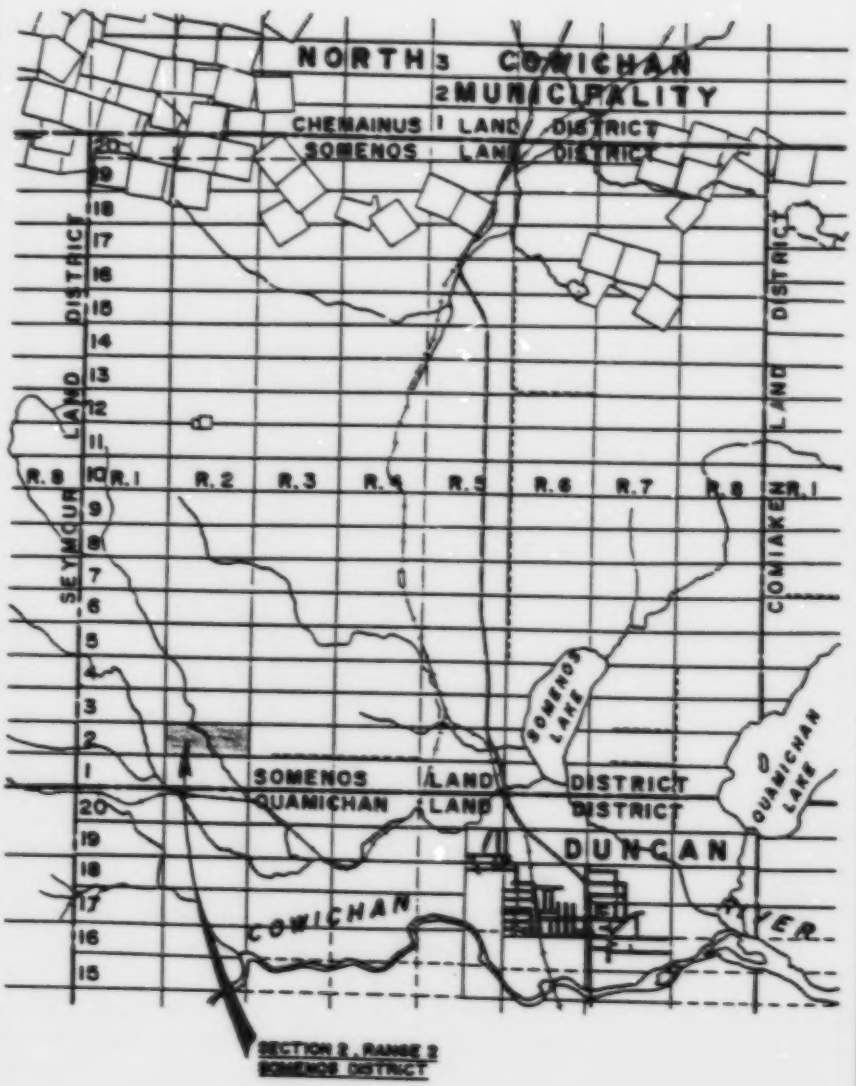

VICTORIA DISTRICT OFFICIAL MAP 1858.
OAK BAY
VICTORIA
ESQUIMALT
JUAN DE FUCA STRAIT
SECTION 88, VICTORIA DISTRICT.

PLATE 2


NORTH COWICHAN
MUNICIPALITY
3
2
1
CHEMAINUS LAND DISTRICT
SOMENOS LAND DISTRICT
SEYMOUR LAND DISTRICT
COMIAKEN LAND DISTRICT
R.8
R.1
R.2
R.3
R.4
R.5
R.6
R.7
R.8
R.1
SOMENOS LAKE
QUAMICHAN LAKE
SOMENOS LAND DISTRICT
QUAMICHAN LAND DISTRICT
DUNCAN
COWICHAN
RIVER
SECTION 2, RANGE 2
SOMENOS DISTRICT

direction of the coastline. In another area, on Saltspring Island, the base line along which posts were set every 20 chains was the direction of the valley between Fulford Harbour and Burgoyne Bay. (Plate 2A).

The bulk of the surveying on Vancouver Island quickly evolved into a system, quote *"a rectangular form, and the shortest side of the said rectangle, shall be two-fifths the length of the longest side, and the boundaries of such land shall also run as nearly as possible to the cardinal points of the compass".(11)* Pre-emption allowances of this year, 1861, by the same Vancouver Island Proclamation, were 150 acres for a single man and 200 acres for a married man with his wife accompanying him.

In the following year, 1862, the entitlements were reduced to 100 acres for a single man and 150 acres for a married man.(13) At this time the shape was supposed to be such that the *"shortest side was at least two-thirds the length of the longest side"*. Lot 37, Group 1, New Westminster District (though not on Vancouver Island) was also surveyed in these proportions. Reference was also made to the adoption of Natural Boundaries as land Boundaries. The reason why so many 100 acre Sections were conveyed in halves by description, no doubt is explained by the 150 acre entitlements versus 100 acre entitlements. The pre-emption entitlement by a British Columbia Proclamation of 1860 was 160 acres and this later developed a tendency to split the 100 acre Sections 60-40 by description.

The Sections of 20 chains latitude by 50 chains in departure were numbered numerically from south to north in each particular Land District and numbered in Ranges. Usually this was done east and west of a central meridian but sometimes only east of a meridian on the west boundary of a Land District.

The Land Districts on Lower Vancouver Island, around Victoria are frequently bounded by natural boundaries or are defined by lines joining prominent topographical features, i.e. Knockan Hill to Mt. Douglas. However there are a number of Land Districts in the area between Victoria and Nanaimo on the easterly side of the Island which are basically 5 miles square, containing 160 Sections of the popular 20 x 50 chain system. Here again, the 5-mile-square was an adaptation of the Australian system of dividing the land into Counties, *"hundreds"*, and parishes. A *"hundred"* is one hundred square miles or 10 miles x 10 miles. This is mentioned in Captain Frome's chapter on Colonial Surveying, and reference to this size appears in Pemberton's diary. In fact in 1860 Governor Douglas received a suggestion in the mail from the Duke of Newcastle, the Undersecretary of State on how to divide up and run British Columbia. It came in the form of an enclosure of a draft Order-in-Council prepared in England by Captain A. Clarke of the Royal Engineers who had been in Australia and proposed the whole province be divided in counties, hundreds and parishes. Obviously Captain Clarke had never been to British Columbia. It appears that Governor Douglas instituted the 5-mile-square Districts as a variation of the recommended 10-mile-square *"Hundreds"*, in an attempt to make this rigid

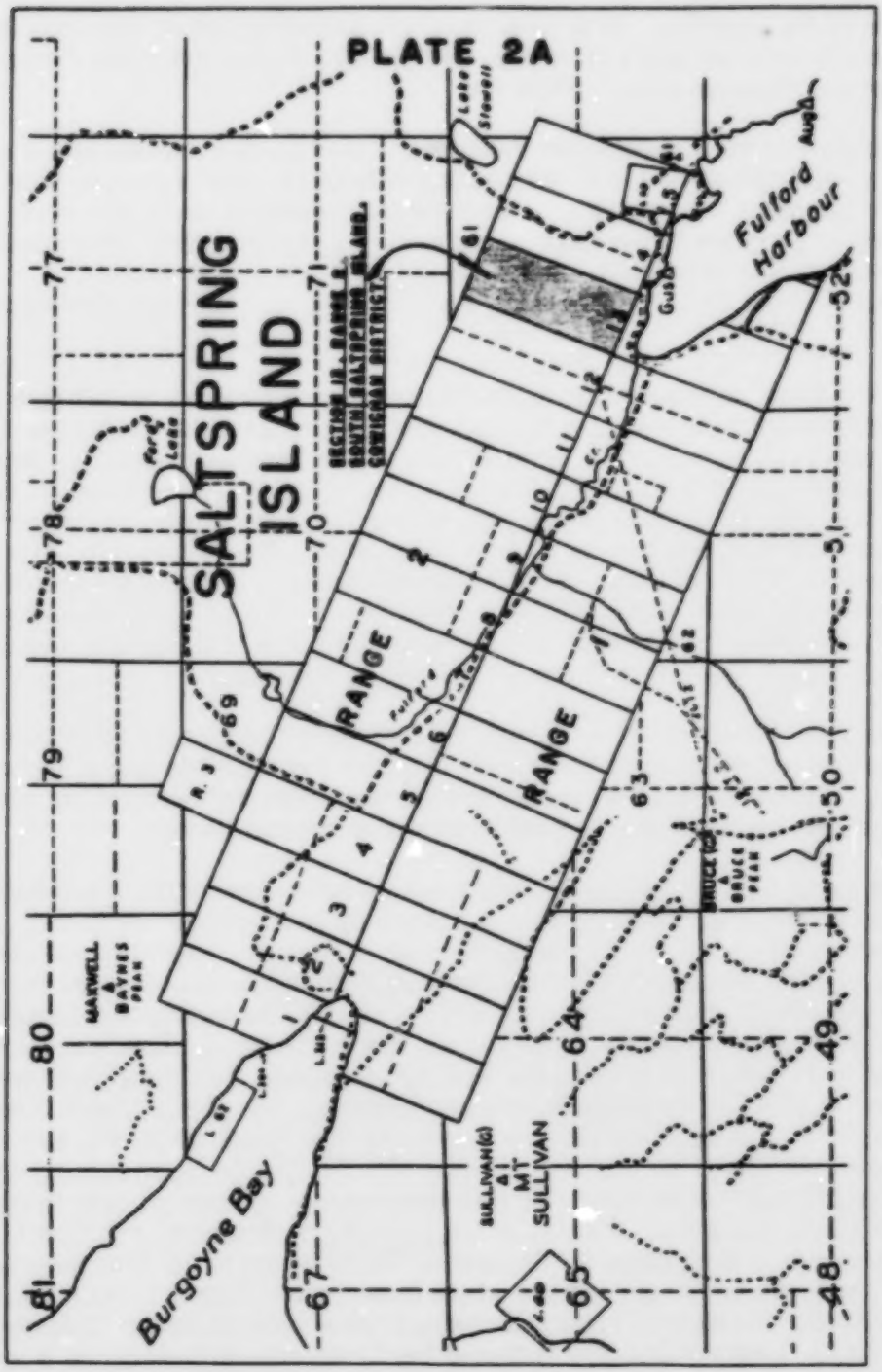


PLATE 2A
SALTSPRING ISLAND
RANGE
RANGE
Fulford Harbour
Burgoyne Bay
MT SULLIVAN
77
78
79
80
81
70
71
64
65
67
48
49
50
52
63
69

system more compatible with the rough topography, and only in a limited part of Vancouver Island. It is usually a sound policy to accept some part of the suggestions of a superior - even Governor Douglas must do this at times.

The corners of these early surveys were quite well marked by comparison with some of the work which followed later on the Mainland. Bearing Trees were usually cut and marked, and posts set with crockery, charcoal or broken glass below the post. There is a lot of satisfaction when surveying and a small pile of moss-covered stones is located, to be able to positively identify it as the site of a post by reaching into a hole and finding pieces of an old rum bottle or a broken English china plate. But where did this practice originate? No references appear in the Australian sources. It seems likely that the lead may have come from the practice in the United States, as Pemberton had knowledge of their system. More will be said of the American manual when discussing the third system, but at this point it should be noted that this manual gives instructions on making Bearing Trees and placing posts with pieces of charcoal under. Notching of line trees with two notches, one above the other, instead of the tree notches in use later in British Columbia is also referred to as well as the standard method of blazing with two blazes quartering the line. There was no limit of distance from the line from which blazing should cease similar to the 6-foot limit in British Columbia. Pits and trenches were required at certain corners. The booking in the Field Book was commenced at the top of the page. In the American system the distance and bearing to, and size and species of tree is shown in the field notes, but on the tree itself is marked the Range, Township and Section numbers. This system of carving Bearing Trees has not been a policy in British Columbia but at least one case is known where it was followed. In the Salmon River Valley near Kelsey Bay on Vancouver Island bearing trees can be found with Section and Township number carved in Roman Numerals. The surveyor must have been an American of Italian descent.

Third System 1858 - Sections, Ranges, Blocks

(See Plate 3.)

The Crown Colony of British Columbia was formed in 1858 with James Douglas as Governor, with headquarters at Fort Langley on the Fraser River. A survey section under Captain Parson, part of an advance party of Royal Engineers arrived the same year. Colonel R. C. Moody, commanding the whole Royal Engineers establishment was Chief Commissioner of Lands and Works under Governor Douglas. There is a most interesting letter written by Colonel Moody concerning the proposed survey system, that is worth quoting in full.(14).

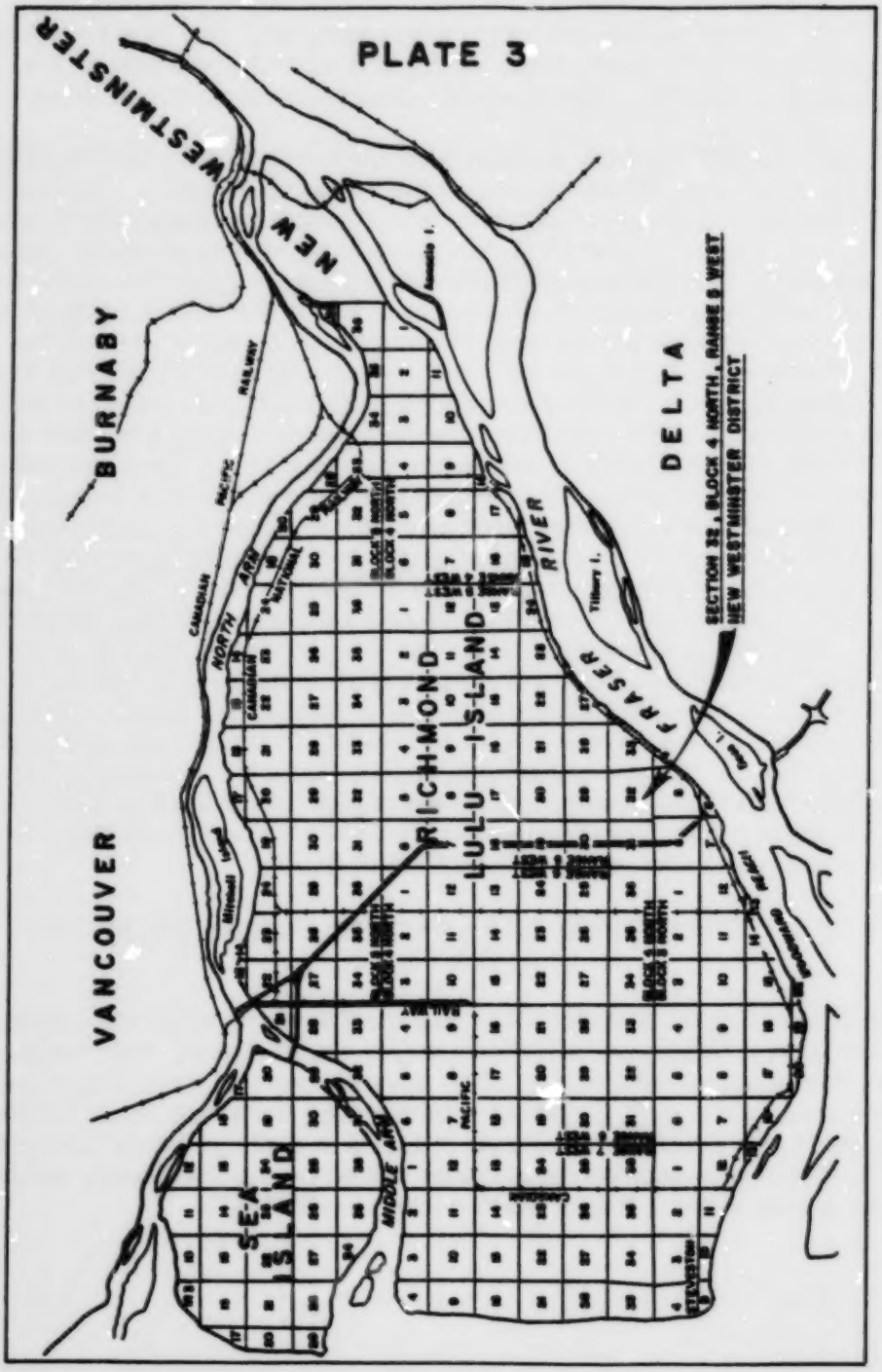


PLATE 3
WESTMINSTER
NEW
BURNABY
VANCOUVER
RICHMOND
LULU ISLAND
SEA ISLAND
DELTA
FRASER RIVER
NORTH ARM
MIDDLE ARM
SECTION 33, BLOCK 4 NORTH, RANGE 6 WEST
NEW WESTMINSTER DISTRICT

Department of Lands and Works
British Columbia
Queensborough

"James E. Tilton, Esq.,
Surveyor General
Olympia

18th June 1859

Sir:

It has been determined to survey the rural lands of British Columbia on the System adopted in the United States Land districts of Oregon and Washington.

I shall esteem it an act of great courtesy if you would have the kindness to forward me a few Copies of the Books of Instructions to Deputy Surveyors, which will be invaluable to me in carrying out the details of the Survey.

Any suggestions of a practical character which your experience may lead you to consider as likely to be of service to me, with respect to officework the modes of calculating the distances and to the checking and examination of the work generally will be most acceptable and valued by me as highly as I feel convinced they will be cordially offered by you.

I have the honor to be, Sir
your most obedient servant
(signed) R. C. Moody, Col. R. E.
Chief Commissioner of Lands and Works"

To this letter, no reply has been located but it quickly produced for Colonel Moody the information he needed. In the Royal Engineers Survey Records in the Surveyor General Branch, Ministry of Crown Lands, there is a notebook which is a hand-written copy of the first 31 pages and page 1 and part of page 2 of Appendix A of Instructions to the Surveyor General of Public Lands of the United States.(15)

The system is a 36-Section, 6-mile square Township and Range System with a base line set at right angles to a principal Meridian and the Townships numbered all North, and Ranges numbered east and west of the Central Meridian. The Sections are numbered with 1 in the northeast corner and west then east on the second tier south, etc. Exactly opposite to the numbering in Canadian systems.

Colonel Moody lost no time after receiving the Manual in making a few changes to the system, i.e. he cut the sections down to 160 acres and called the Townships "Blocks" and got out his first letter of Instructions (16) for the unique system. The area surveyed subsequently was restricted to Sea and Lulu Islands between the North and South Arms of the Fraser River.

"(No Addressee)

Office of Lands and Works
British Columbia
22 July 1859.

Sir:

In conducting the Surveys committed to your charge you are hereby instructed,

1. *To take as the initial point of Survey the fixed point near Semiahmoo where the 49th Parallel intersects the ocean.*

2. *You are to run from said point, a base line Eastward to the extent of the requirement of your Survey.*

3. *From the initial point of aforesaid, you are to run a meridian line to be named the "Coast Meridian" which meridian you are to extend Northward to the Northernmost limits of the District embraced by your contract.*

4. *At twelve Miles North from said initial point on the said Meridian line you are to run a standard Parallel west to the ocean and Eastward to the limits laid down in your contract.*

5. *From said standard parallel as a base you are to run the exterior lines of your Blocks, North and South from said parallel as will best suit the configuration of the survey provided always that where such meridian or base line standard parallel or exterior line of Blocks intersects a country impracticable for Survey, the same may be extended by offsets on Section line.*

6. *The Blocks to be 3 miles square or thereabout, to be numbered East and West of the said Meridian and North from the base line (49° Latitude) and to contain 36 sections (except where made fractional by local circumstances) each 40 chains square or thereabouts, to be numbered from one to thirty six commencing at the Northeast Corner and running from East to West and from ~~West to East Corner and running from East to West and From~~ West to East alternatively through the Block.*

7. *At each Block and Section corner post to be set and established with four bearing trees when practicable and at meander corners with bearing trees where practicable and Post and bearing trees to be established and marked in all respects as in the United States land survey.*

I am
your most obedient servant
(signed) R. Moody"

This survey was performed by Mr. J. W. Trutch but obviously it was not too popular a decision as evidenced by the following quote from correspondence dated 14th July 1859 from James Douglas, Governor to R. C. Moody.(17)

> *"It has been represented to me that the method of surveying intended to be pursued by Mr. Trutch is one which is very imperfect and highly objectionable, and which although frequently practised in the United States has led to much inconvenience and endless litigation. This is a matter of detail connected with your Department into which of course it is not necessary for me to enter, but I deem it right to mention the matter notwithstanding."*

Perhaps this criticism of the U. S. survey system was motivated by reasons other than honest experience. Douglas wanted the capital of British Columbia moved from Langley to Victoria and Moody wanted the capital at New Westminster where he was building his barracks and Douglas was not one to contemplate losing a battle.

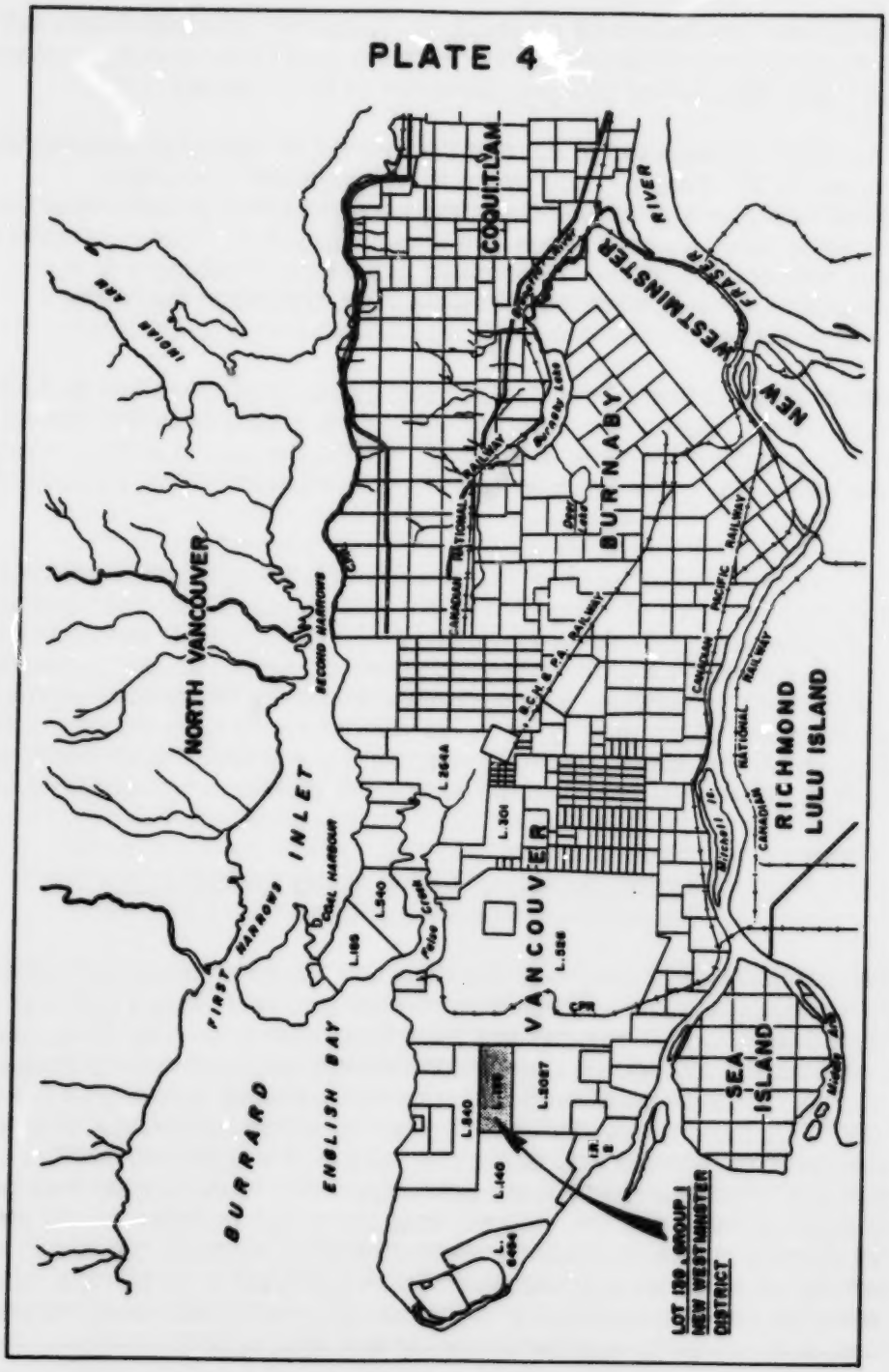
But likely his condemnation of the American survey system was more a result of his disenchantment with all things American. His digestion had been seriously disturbed a few days prior when an American settler, named Cutler had surprised a pig, the property of the Hudson's Bay Company on San Juan Island, routing in his potato patch and had shot it. The shot reverberated for many years and touched off what has been called the Pig War. No wonder he condemned their survey system, it was within a few days of his dispatching a British Frigate bristling with cannon in an attempt to intimidate the Americans at their camp on San Juan Island. (18)

Fourth System - Variable Sized District Lots

(see Plate 4.)

Between 1859 and October 1863 (when the Royal Engineers were disbanded) besides surveying a number of road and bridge locations along the Fraser River watershed they laid out a number of Towns into Town Lots. (19) They were also responsible for the District Lot Layout between the North Arm of the Fraser and Burrard Inlet. These were of irregular size varying in area from fifty to five hundred acres.(20) The system was dominated by an adherence to cardinal directions for the boundaries despite the lack of standard size and is quite different from the first system in the Victoria area, 10 years previously. This fourth system was part of the settling down process and the irregular sizes were later replaced by the standard District Lot system, described as the Eighth System. Although the scope of this work will not allow for an examination of Town Lot systems or sizes, a most important principle of surveying, i.e. that posts in place govern over recorded distances, is illustrated by a letter written by Col. Moody.(21)

PLATE 4


NORTH VANCOUVER
BURRARD INLET
ENGLISH BAY
BURRARD
VANCOUVER
BURNABY
COQUITLAM
WESTMINSTER
NEW
RICHMOND
LULU ISLAND
SEA ISLAND
FRASER RIVER
INDIAN ARM
FIRST NARROWS
SECOND NARROWS
CORAL HARBOUR
PINE CREEK
L.180
L.340
L.2644
L.301
L.526
L.3067
L.140
L.6484
I.R. 2
CANADIAN NATIONAL RAILWAY
CANADIAN PACIFIC RAILWAY
B.C.E.R.
LOT 139, GROUP 1
NEW WESTMINSTER
DISTRICT

"H. Holbrook, Esq.,
New Westminster

New Westminster
20th April 1860

Sir:

With reference to the request made in your letter of this day's date I have to inform you that I purposely abstained from defining the exact dimensions of the Lots in the City of New Westminster knowing that the obstructions arising from the forest and the nature of the ground would physically preclude absolute accuracy. The lots therefore were sold as defined by the original pickets then existing on the ground: - it is possible some of these may since have been disturbed.

I may add however that the frontage of the lots in Columbia St. and in many other streets was intended to be as nearly sixty-six feet as a surveyor could measure on the ground in the state it was at the first sale.

I regret any inconvenience that may arise to you or to others from assuming that it was practicable to lay out lots on the ground with absolute precision.

I have, etc., etc.
(signed) R. C. Moody,
Col. R.E., L.W."

Miscellaneous surveys, Indian Reserves, timber tracts and some pastoral surveys were made in the period 1860-73 but no real new system developed. The delay in starting was caused in part by the Railway Reserve in the Terms of Union by which British Columbia ceased to be a Crown Colony and became a Province in 1871. A decision had to be made regarding the mainland terminus of the railway in order to establish the 20-mile reserve on either side thereof. The Province attempted an agreement with the Dominion Government to be reimbursed for cost of any surveys that might later fall within the Railway Belt, but was unsuccessful.

Fifth System 1873 - Townships in New Westminster District

(See Plate 5.)

By June 1873 when the clauses in reference to Provincial lands in the Terms of Union terminated (The Dominion was obliged to commence construction of the railway within 2 years but did not do so) a start was made on Townships in the New Westminster District. The report of that year says:

PLATE 5

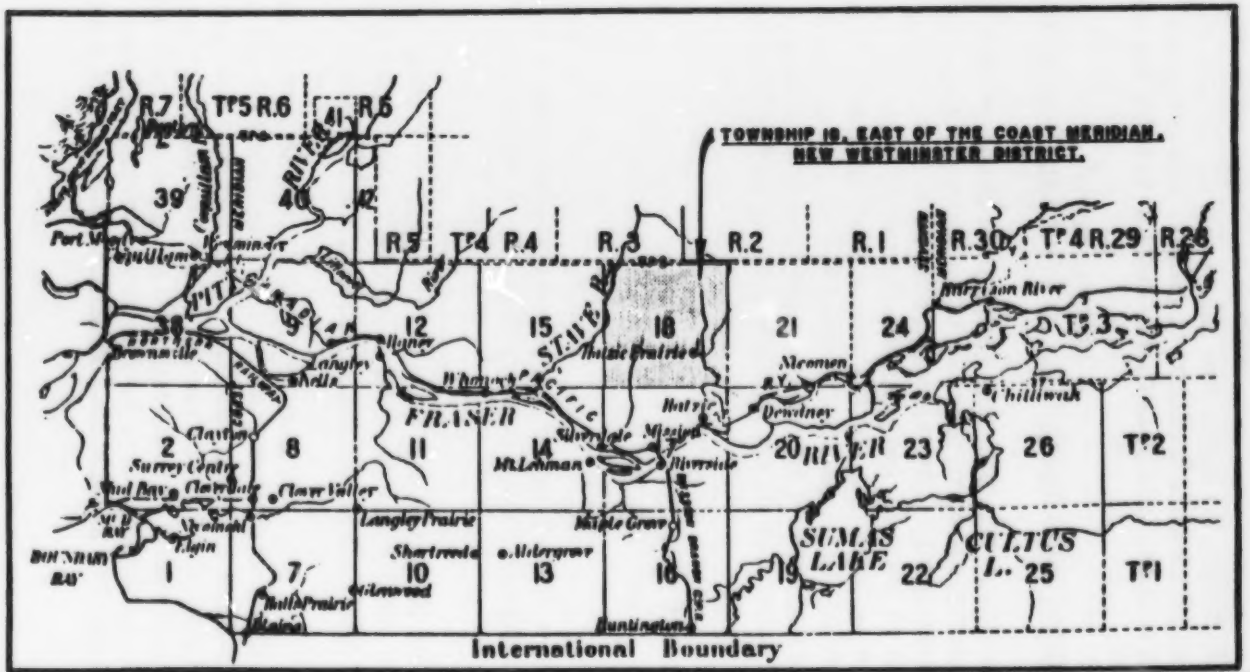
MAP

SHOWING THE BOUNDARIES OF THE

FIFTH SYSTEM OF SURVEY

IN THE

PROVINCE OF BRITISH COLUMBIA



"The system adopted this season has been as nearly as circumstances would permit, similar to that in use in the Dominion, in the Province of Manitoba and also by the Govt. of the United States on this coast, viz. laying the land off in blocks six miles square, called Townships and subdividing these Townships into sections one mile square, placing the quarter section posts on the section lines."(20)

The Manitoba Manual of 1871 makes no mention of how lines are to be blazed. It does refer to Bearing Trees as we know them, but does not refer to line trees.(23)

There were no road allowances provided in these Townships except in Tp. 12 where they were laid out North and East of the section line boundaries. By 1874 most of the Townships between Boundary Bay and Chilliwack had been surveyed by contract.(22) The lowest price seems to have been $19.00 a mile. The numbering of these Townships began at Twp. 1 adjoining the Coast Meridian on the east and were numbered East and West of that meridian. There is some semblance of a consecutive numbering system in some parts but overall the numbering is a disaster and in this respect it did not follow the Dominion System.

An interesting insight into the surveying in this area is given in an article by W. N. Draper, B.C.L.S., and the following is worth quoting.(26)

"The Surveyors of 1873 and 1874 have the most interest to us, as they did more work than had been done before their time. Of these, Mahood, Ralph and Turner stand out conspicuously.

Mahood did uniformly good work, though he seems of a set purpose to have had his chain too long, but it was always uniform.

He re-ran the Coast Meridian and destroyed all the posts set by J. W. Trutch after the first mile and a half, till he came to the first standard parallel as established by Trutch, which he did not change--that made his northern tier of quarter sections about 4 chains short (F.B. 5/73 P.H. I, Gp. 2, NWD 2 Tube 22)

Wm. Ralph subdivided Township one, and in re-tracing his work the Surveyor knows just what to expect. I once ran three miles between two of his posts where all the intermediate posts were missing, and I found the total distance to be three miles and 75 links. I divided the distance and found the stubs of every one of the intermediate posts within a link of the calculated position."

When it was conceded by early surveyors that it was not always possible to measure what was intended to be measured (letter of 20 April, 1860, Moody to Holbrook, previously quoted) and when it is realized that a surveyor such as Mahood always kept his chain longer than the standard 66 feet (he did this to automatically increase the acreage in every section to allow for roads which would later be needed -though he did not increase the recorded dimensions) and other surveyors did not do this, - it is brought home to the practising surveyor that plan distances from old surveyors are not necessarily a good method of restoring a corner. And also that proportioning distances is only tolerable when the work of one surveyor is involved. To proportion a long line, measured by long and short chains would result in no post being reset in its original position.

Geographically 27 full or partial Townships surveyed by British Columbia under this system fell within the Railway Belt when the decision on those boundaries was made. When the transfer of the Belt was made to the Dominion they took over copies of all the notes and plans and adopted this system as the Fifth System of Survey. It is thus referred to in the Dominion Survey Manual.

In the Statutes of 1874 - An Act to amend and consolidate the Laws affecting Crown lands in British Columbia - there is an interesting reference at Section 76 to Timber Lots.

> *"In the subdivision of Townships which may consist partly of prairie and partly of timber land, such of the sections or subdivisions of sections, containing Islands, Belts or other tracts of timber may be subdivided in such number of wood lots of not less than 10 and not more than 20 acres in each lot, as will afford so far as the extent of wood land in the Township may permit, one such wood lot to each quarter section prairie farm in such townships."*

A good example of 20-acre timber lots is the subdivision of Sec. 3, Tp. 5, W.C.M., N.W.D. adjacent to the 49th parallel near Tsawwassen (4 locker F), illustrated on Plate 5A.

Other less orthodox small timber claims of varying dimensions occurred in surveys by Mahood, scattered throughout Townships 4, 5 and 6 N.W.D. (see F.B. 33/74, P.H. 2, Gp. 2, N.W.D.).

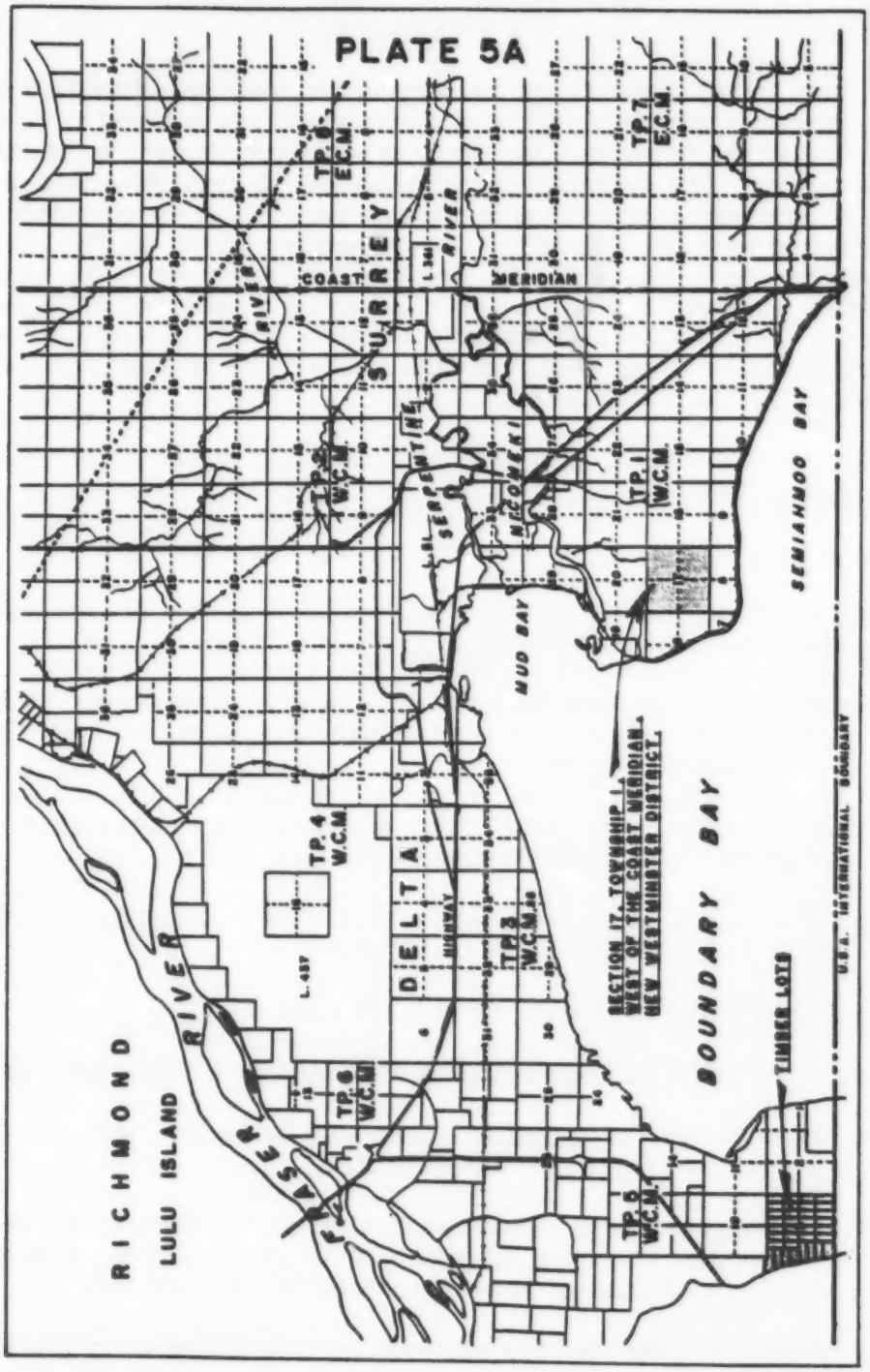


PLATE 5A
RICHMOND
LULU ISLAND
FRASER RIVER
DELTA
SURREY
COAST MERIDIAN
SERPENTINE RIVER
NICOMEKL RIVER
MUD BAY
BOUNDARY BAY
SEMIAHMOO BAY
TP. 4 W.C.M.
TP. 6 W.C.M.
TP. 3 W.C.M.
TP. 6 W.C.M.
TP. 2 W.C.M.
TP. 1 W.C.M.
TP. 1 E.C.M.
TP. 7 E.C.M.
SECTION 17, TOWNSHIP 1, WEST OF THE COAST MERIDIAN, NEW WESTMINSTER DISTRICT.
TIMBER LOTS
U.S.A. INTERNATIONAL BOUNDARY

Sixth System - Provincial Townships
(See Plate 6.)

In 1879, by the Crown Lands Amendment Act, there appeared the first real Township system adopted by British Columbia which was adhered to for any length of time. Again the American System then in vogue influenced to some extent the system adopted. The similarities are that there are no road allowances and the survey is supposed to commence on the east boundary at the southeast corner and run north and west. For example, the tier of sections on the east boundary is surveyed first, i.e. 1, 12, 13, 24, etc., and then the second tier, 2, 11, 14, etc., is completed. However, nothing was laid down about convergence in the system adopted and in fact it was a quadrilateral township in the true sense of the word. The section system of numbering from the southeast corner then west, similar to the Dominion System was maintained.

Very detailed Instructions to surveyors governing the marking of a survey in the field appeared for the first time as a truly British Columbia System.

(a) All lines shall be run to the cardinal points of the compass.

(b) Transits, theodolites or other instruments independent of the magnetic needle must be used in running lines.

(c) Section posts shall not be less than 4 inches square, 4 feet out of the ground, and scribed with the number of the Township and adjoining sections on the sides facing them.

(d) Quarter section posts shall not be less than three inches square, three feet out of the ground and marked 1/4S.

(e) All posts shall be squared two feet from the top except 1/2 section posts, which shall be flattened only on two sides.

(f) All posts shall be pointed at the top to shed water.

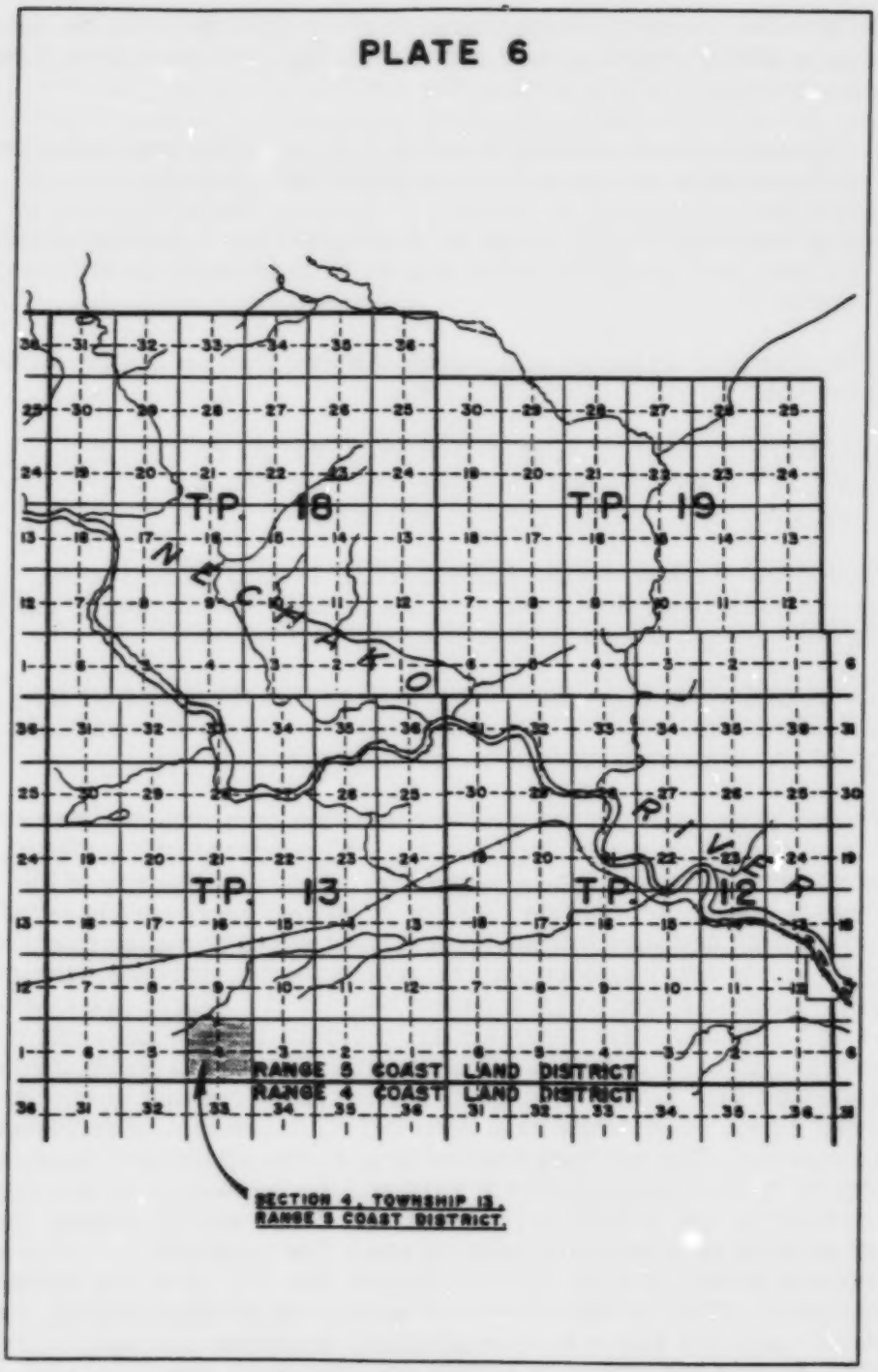
(g) All posts shall be securely placed in the ground where practicable.

(h) Pieces of charcoal or marked stones shall be placed under each post, and the fact carefully noted in the field book.

(i) In prairie, posts shall have mounds raised around them to a height of at least two feet six inches, either of earth or stones, and the post to be scribed with number of Township and Section on each side.

(j) Mounds shall be three feet squared base. At a distance of one foot from each side of each mound, a trench shall be dug at least two feet wide and one foot deep.

PLATE 6


TP. 18
TP. 19
TP. 13
TP. 12
RANGE 5 COAST LAND DISTRICT
RANGE 4 COAST LAND DISTRICT
SECTION 4, TOWNSHIP 13, RANGE 5 COAST DISTRICT.

(k) On rocks or where it is impossible to sink posts, they shall be surrounded by a cairn of stones at least thirty inches high, the base to be three feet square.

(l) Four bearing trees shall be taken for every post, the trees being marked B.T. with distance from post and faced towards the post.

(m) The lines through timber shall be thoroughly blazed, two blazes to be made on each tree quartering on the line, so as to be easily distinguished and traced.

(n) No tree shall be blazed at a greater distance than six feet on either side of the line.

(o) All line trees shall be notched with three notches on each side in the direction of the line, and their size, kind of timber, and distance from the last section corner, shall be given in field notes.

There followed a long list of requirements for making up field notes. The principle convention established was split line booking from bottom to top of page. All other requirements are well known in current regulations.

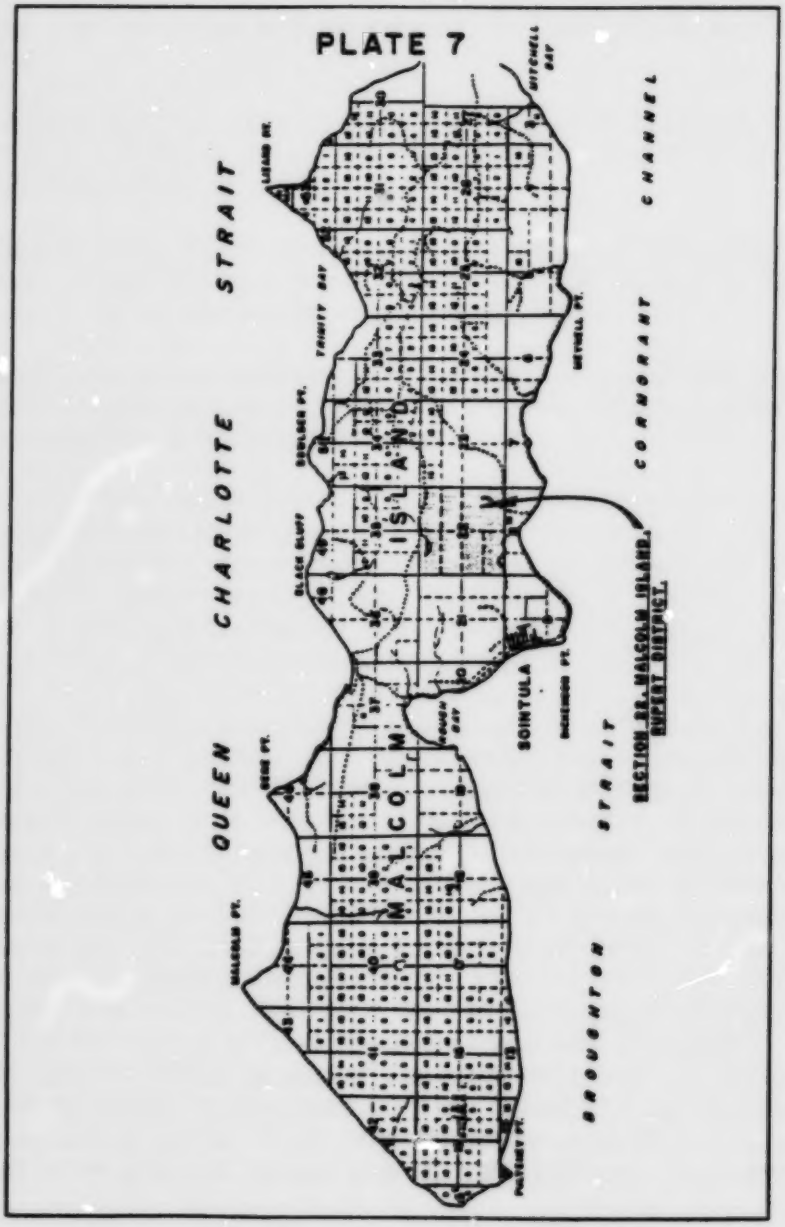
This general system was theoretically in force until dropped from the Land Act of 1970. Certain amendments were made over the years and in particular the question of convergence is recognized and dealt with.

The central meridian of the township is now the governing meridian with all interior lines parallel or at right angles to it. The boundaries of the township are established prior to running interior lines. The excess or deficiency of the measurement due to convergence, or error, is allowed for in quarter sections adjoining the east and west boundaries and other errors of measurement are allowed for in one tier or quarter sections only, adjoining either the north or south boundary. Where the area to be surveyed was not of sufficient size to allow for four or more complete townships being laid out, a system of rectangular lots (District Lots) was adopted. As a general rule a new meridian was to be adopted at not greater intervals than 6 miles of longitude. The system appears to have been used to a limited extent, where lands have been laid out in advance of settlement at the Crown's expense. The last complete township on this system was surveyed as Township 39 in the Cariboo District in 1914 and the last survey on this system of any consequence was in 1919 in Townships 22, 24, 33 and 34, Cassiar District when 26 sections were surveyed covering some Coal Licences. In General Instructions to British Columbia Land Surveyors, May 1st, 1912, the Surveyor General instructed that no new Townships were to be surveyed without special instructions - and that seems to have effectively terminated the system. Intermittently since then, an odd half-section or section has sometimes been surveyed on lands adjoining, under application to purchase from the Crown, but for all practical purposes the system is extinct. In all, only 367 whole or partial townships have been surveyed in the province, spread over 22 Land Districts. The townships bear a

numerical system of numbering but there is very little consistency between districts. For example, in the earlier surveys the numbers commenced at one in each district regardless of the position of the township with respect to the boundaries of the district. Latterly, it is apparent that one or more progressive systems was planned in each district but even their systems do not denote much consistency between districts. The numbers are not consecutive. For example, in the Peace River District there are 19 provincial townships surveyed outside the Peace River Block and the numbers begin at 19 and end with 119.

Seventh System - Island Townships
(See Plate 7.)

A variation of the same field survey system but with a different recording system appears on a number of the larger islands adjoining Vancouver Island. They have been divided into the same 1-mile-square sections but no Townships were created due to the shape and relatively small size of the islands. However there does occur as many as 65 sections on one Island. The name of the island is substituted for the township. An example of a description would be: Section 53, Malcolm Island, Rupert District.



Eighth System - District Lot System
(See Plate 8.)

The standard District Lot system as we know it throughout British Columbia had its beginnings in the Land Proclamations of Vancouver Island of 1861 and 1862 and the Mainland of British Columbia Proclamation of the 4th of January 1860.(24) This was the attempt by Governor Douglas to introduce the cardinal directions and the rectangular form with one side at least two-thirds the length of the other. At least this was a good protection against long, narrow river front lots as have appeared in some of the older settled countries.

These stipulations by proclamation remained in effect until in 1870 they were enacted into an Ordinance.(25)

In the Statutes of 1874 a change of shape was authorized and several alternative lengths were cited in chains. Either 40 x 40 chains, 20 x 80 chains, 40 x 80 chains, 20 x 20 chains, 20 x 40 chains, or 20 x 60 chains. These alternatives remained in force up until 1952 although several more were authorized in the intervening years, when the amount of land a person could acquire in one application was increased from 320 acres to 640 acres. The additional combinations of distances were as follows: 40 x 60 chains, 60 x 60 chains, 60 x 80 chains or 80 x 80 chains. An amendment to the Land Act in 1953 reduced the system to simplicity and now all lots are to be rectangular in shape and no boundary is to exceed 80 chains in length. Right angle "jogs" of 20 or 10 chains are allowed. In 1970 by B.C. Regulation 4/70, jogs of 330 feet were allowed.

At the present time there are 82 Land Districts and the lots are numbered numerically in order of date of survey (with many exceptions to this in the last decade.) In a few of the small, less active Land Districts the number of lots still remains less than 500; whereas, in the larger districts the present numbers being issued are in the 12 - 13,000 range and the total number of District Lots is well up over the 100,000 mark.

This District Lot System is the most widely used in the Province because of its flexibility for use in unsurveyed areas. In general all land in British Columbia is open to "stake and advertise" one's intention to acquire it, subject to statutory limitations and reserves. Areas are not necessarily developed progressively, and pioneer types repeatedly acquire remote areas where it is uneconomical to tie the new survey to former ones. The requirements for connections between surveys which have been in existence for 50 years are that all surveys will be connected to existing surveys, provided such surveys are situated within the following distances:- one mile, if in heavily wooded country; two miles if in semi-open or open country; three miles along a trail, road, ice or open foreshore. If no previous survey is within those distances, a tie shall be made to a Provincial triangulation station or topographical feature.

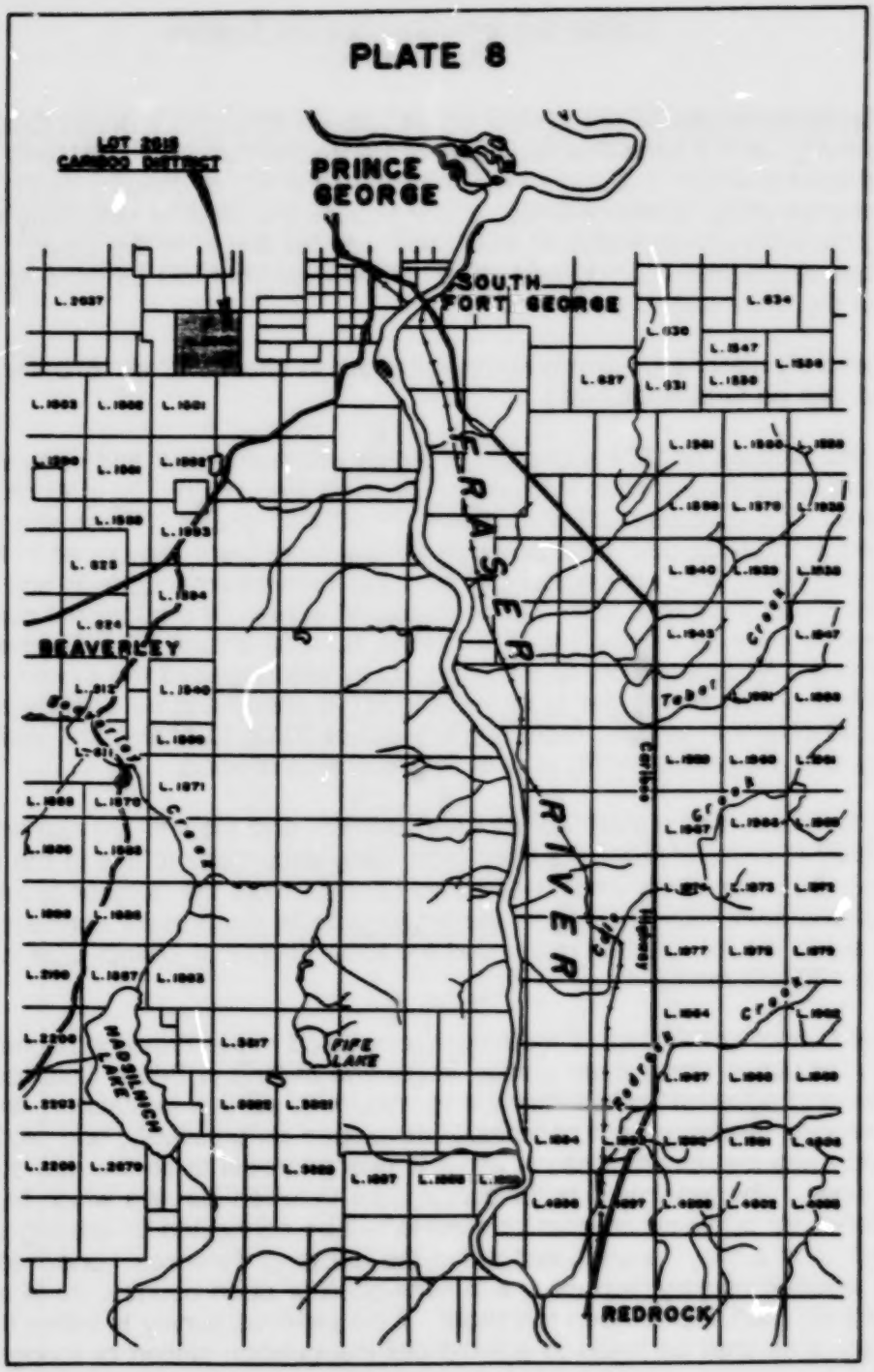


PLATE 8
LOT 2019
CARIBOO DISTRICT
PRINCE GEORGE
SOUTH FORT GEORGE
FRASER
RIVER
BEAVERLEY
Creek
MADILLINCH LAKE
PIPE LAKE
REDROCK

The necessity of tieing, merely to position the survey on a map is less important nowadays with the good coverage of detailed, accurate planimetric maps available in the Province. Location is heavily dependent on good monumentation.

This District Lot system is unrestricted and allows a certain amount of opportunity for a surveyor to demonstrate his sense of values as he frequently has only to "close" on his own work and not onto some overall pattern. This is beautifully illustrated by the following quote from the autobiography of an understanding old gentleman.(27)

> *"In the matter of the survey of the ranches in the Alberni Valley, it would have saved a great deal of worry and considerable hardship if the land had been surveyed before the settlers took it up. Sometimes a man lost just the piece of alder or maple land he wanted. I remember a very bad quarter of an hour I had when surveying a quarter section for a rancher. The day before I had passed the log house and they were showing me the garden his wife and the children had cleared and planted around the house. One very big stump took them three weeks to burn out. Her hands were scarred and rough, but they were small and nicely shaped. Now, unless one had actually done clearing, they can have no idea of the work it is to dig out even one of those big fir stumps. Well, we had started at the corner post and had run around throe sides and were on the last line. In looking through the transit I noticed a long way off a peculiar brown-looking patch. It did not look quite like a stump. Suddenly a thin wisp of smoke began to rise. I knew then it was the chimney in the centre of the shack. I closed up the business for the day and went back to camp. Something had to be done to get that narrow strip of extra land. To get this strip they were up against a whole lot: the Laws of the Medes and Persians, i.e. the B. C. Land Act, the Settlement Act, and God knows how much red tape. However, next day we finished the survey. Just why there were one hundred and sixty-four acres instead of the orthodox one hundred and sixty in that quarter section was never explained--but the great Coal Baron who owned the land, and who had a kind heart, if he had known, would not have had it different. It was a regrettable error, the chainman's fault of course, or it might even have been put down by some to "a poor brand of Scotch". Ah! what did it matter, the kiddies got their garden."*

Ninth System - Dominion Lands
(See Plates 9 and 9A.)

The 40-mile-wide Railway belt lies on both sides of the Canadian Pacific Railway mainline from the seaboard of British Columbia to the railway system of Canada. The belt was transferred to the Dominion Government following confederation of British Columbia with the other Provinces of Canada. It was surveyed by Dominion Land Surveyors using the 4th System of Survey of Dominion Lands. The fourth system makes no provision for road allowances along any section boundaries but the outside dimensions of the Township area are maintained by increasing the size of the sections to absorb the road allowance.

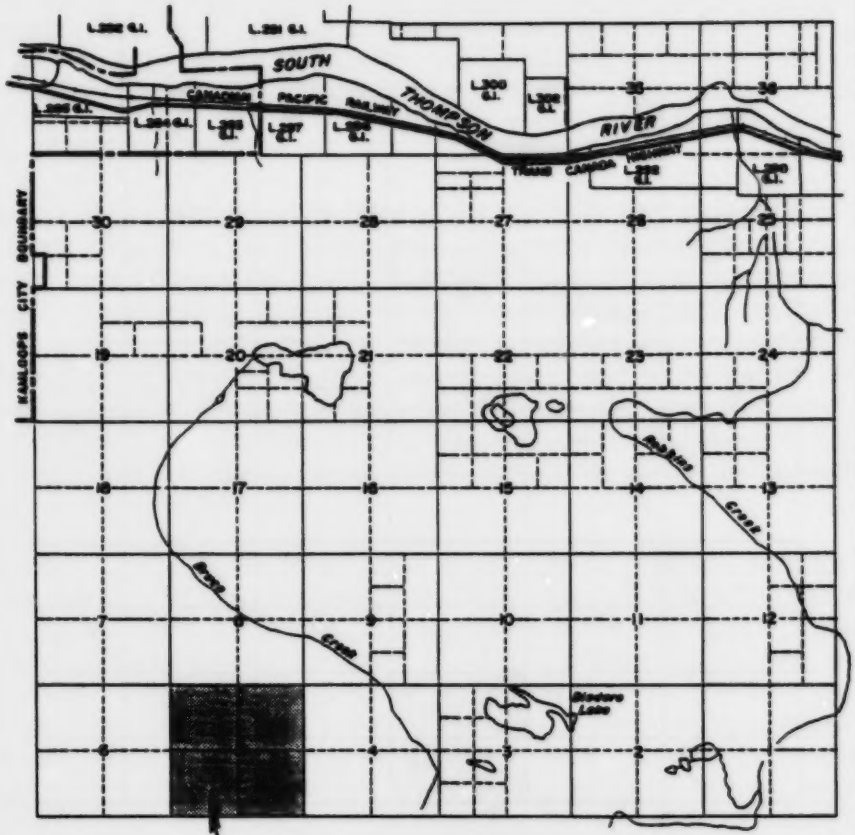
The Peace River Block is an area some 72.4 miles in latitude by 75.7 miles in departure with the north and south boundaries run out at right angles to the British Columbia - Alberta border, being the 120th Meridian. The Block, being a railway subsidy grant of 3 1/2 million acres to the Dominion Government to make up for lands within the Railway Belt which had already been alienated by the Province prior to the Terms of Union, was surveyed commencing in 1910 by the Dominion and a mixture of third and fourth systems of survey of Dominion lands was followed. Since the re-transfer of the Railway Belt and the Peace River Block to the Province in 1930, (chapter 60, S.B.C. 1930) the surveys have been under Provincial control and variations of survey have crept in. In general, the area within the Block and south of the Peace River itself, which is still unsurveyed, is considered, due to its broken topography to be unsuited to the Township system, and the District Lot system is used. In the area north of the river, which is still largely unsurveyed, either the third or the fourth system is perpetuated depending on the suitability of the land to the rigid road system created by the third system.

The Dominion Land Survey systems are a study in themselves and reference must be made to the Dominion Manual for a proper understanding of it.

Small homesite and commercial lots fronting the Alaska Highway in the unsurveyed part of the block would be surveyed with the side lines parallel to the general trend of the road, or to the cardinal points depending on the direction of the road. It is interesting here that the tendency apparent in the first surveys on Vancouver Island in 1851 under J. D. Pemberton for the surveys of small allotments to be made at right angles to a frontage road is being maintained on the Alaska Highway and other surveyed highways through unsurveyed land. The same principle is being followed at the present time with small allotments fronting on bodies of water.

PLATE 9

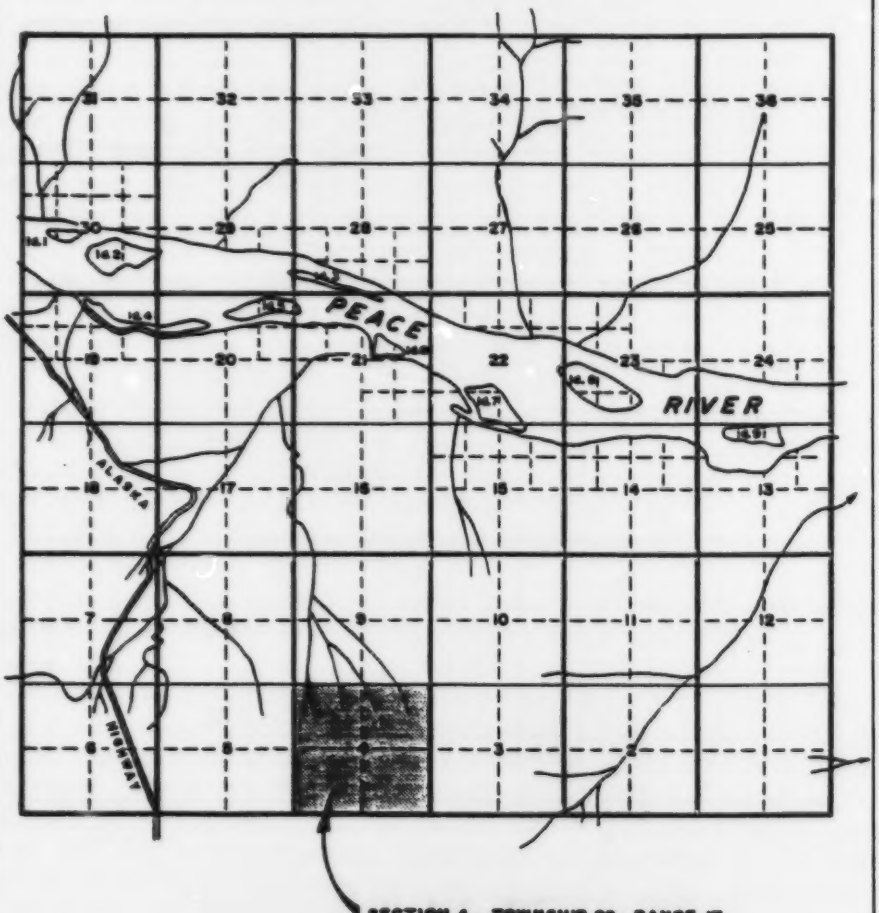
Township 19, Range 15, West of the Sixth Meridian



SECTION 8, TOWNSHIP 19, RANGE 15,
WEST OF THE SIXTH MERIDIAN,
KAMLOOPS DIVISION OF YALE DISTRICT.

PLATE 9A

Township 82, Range 17, West of the Sixth Meridian



General Remarks

There are several notable surveys which cannot be fitted into any system.

There are several large lots in the Kootenay District of southeastern British Columbia which were Railway Subsidy Lots, granted in aid of construction of various Railway Companies. These are each several thousand acres in extent, some with even a regular shape of 3 miles north by 6 miles west and these lots have a number under the District Lot system. Others are known as the "Tie Reserves" and have a name as, for example, "Goatfell Tie Reserve", but no number or Land District. A number of the District Lot subsidy lots were divided by the railway companies themselves after they received their grant, into Townships using the Provincial system, so that not all Townships, which on the face of things appear to be original government surveys, are such. A number of them in the Kootenay District are really subdivisions of District Lots.

Then, we have the Esquimalt and Nanaimo Railway Land Grant which is a substantial block of land roughly covering the southeast quarter of Vancouver Island, and containing itself 25 separate Land Districts. Subsequent to the Sections which were surveyed therein by the Province before the transfer in 1885, the railway company has since been using the District Lot numbering system and adhering to the Land District boundaries for describing original surveys when the purpose of the alienation was for use of the land. When the land was alienated for timber cutting only, a Block numbering system was used without regard to Land Districts and each successive Block which is surveyed within the boundaries of the Grant is given the next number. (See Appendix "C").

The Gunter's Chain of 100 links has been the unit of measurement for cadastral surveys of the various Section systems and District Lot systems since the inception of these surveys in 1851. Distances on boundaries in the old Hudson's Bay surveys under the Colonial Surveyor were given in full chains if the distance was an even number of chains. Otherwise the distance was given in links. Similarly, uneven acreages were given in acres and roods. However, in 1959, by regulation, the unit of measurement for all original surveys exclusive of those surveys being made under the Dominion third and fourth systems, was changed to feet. This exclusion was removed in 1970 when all measurements including those in the Dominion System were required in feet (B.C. Regulation 4/70, Sec. 3.06).

An example of a method of surveying that has not been used as yet in this Province, (but it may be an improvement on some that have), was written up in the "New Zealand Surveyor", Vol. XXVII, of June 1974.

Rope, Pig and Compass Traverse

"Sir, -- Further to my letter which you published in Survey Review No. 165 my attention has been drawn to a modification of the well-known Rope, Pig and Compass Traverse which was used in jungle areas. For those unfamiliar with the technique the system was to tie the rope of known length to the tail of a pig and drive it off into the bush so that when the rope became taut one knew the distance to the pig and since this made the unfortunate animal squeal, one could take a compass bearing on the noise and hence derive the bearing and distance to the pig. I am reliably informed that a modification of this technique was developed using specially bred pigs, such that when the rope became taut not only did the pig squeal but it also left behind a monument marking its position. I am sure that this technique must have proved a great time-saver.

Yours faithfully,
Peter F. Dale."

Footnotes

1. Report of the Committee on Crown Land of Vancouver Island - Provincial Archives of British Columbia (PABC)
2. Letter, 25 June 1852, James Douglas to Rt. Hon. Earl Gray. - PABC
3. Letter, 16 May 1850, James Douglas to Archibald Barclay Esq. - PABC
4. Papers in connection with Crown Lands of British Columbia and the title of the Hudson's Bay Co. - PABC
5. A Rood is 1/4 of an Acre (Troutwine)
6. Hudson's Bay Grant Book. - Ministry of Crown Lands , Surveyor General Branch -Status Vault.
7. This treatise obtained from Royal Engineers Library in Chatham, Kent, England.
8. J. D. Pemberton's Dairy - pages 15 and 18. - PABC
9. Canterbury Papers 1850. - extracts supplied by Christchurch office of Department of Lands and Surveys, New Zealand.
10. Report of Surveys. - Journals and Sessional Papers 1873/74, pp. 54 and 55.
11. Vancouver Island Land Proclamation - James Douglas, 19th February, 1861.
12. B. C. Papers, Parts I - IV. - PABC NW/971K/G786/C.2.
13. Vancouver Island Land Proclamation 1862.
14. B. C. Letter Book. - PABC C/AB/30.7 J/1.
15. Original copy obtained from Library of Congress, Washington, D. C., U. S. A.
16. B. C. Letter Book, 1 March - 25 August, 1859. - PABC C/AB/30.7 J/1.
17. B. C. Colonial Secretary Correspondence Outward, January 1859 to September 1860. - PABC
18. The Pig War Island, David Richardson, Orcas Publishing Co. 1971.
19. Royal Engineers in B. C., - Judge Howay. - Proceedings of Corporation of B. C. Land Surveyors, 1924.
20. Journals and Sessional Papers, 1873/74. - Provincial Library.

21. Miscellaneous Land Book, August 1959-61. PABC C/AB/20.7 J.2.

22. Surveys - Journals and Sessional Papers, 1875.

23. Manual of Surveys of Public Lands in Manitoba and the Northwest Territories, 1871. - The Carnegie Library of Ottawa.

24. British Columbia Proclamation - PABC NW/346/B862, 1858-65.

25. Ordinance to Amend and Consolidate the Laws Affecting Crown Lands in British Columbia, 1870. - PABC.

26. Early Surveys and Surveyors in the Fraser Valley, W. N. Draper, B.C.L.S. - Proceedings of the Corporation of B. C. Land Surveyors, 1940.

27. Autobiography of Geo. A. Smith, B.C.L.S. - Proceedings of the Corporation of B. C. Land Surveyors, 1935.

28. Copy on file with Surveyor General of British Columbia, (Legal Surveys Section).

Where references such as "4 locker F" or "F.B. 5/73 P.H. 1" etc., appear, these refer to the old Surveys and Land Records Branch filing system (circa 1975).

Appendix A
Diary of an Early Surveyor - 1859

Nanaimo Survey, Diary 1859. B. W. Pearse.
F.8 4/59. P.H.1. NANAIMO

Saturday, April 2nd

7:30 a.m. left Victoria with three men and Mr. Tait engaged Gabourie for voyage at $1.50 per day. 11:15 a.m. breakfast at Cordova Bay. 6:30 p.m. encamped at Admiral Island, tide being against us strong.

Sunday, April 3rd

4:15 a.m. embarked, left guns behind in the darkness lost 3/4 hour fetching same. Went up Cowichan Harbour by mistake. Ret'd and went up "Sansomes Narrows". 10:20 a.m. breakfasted. Ran into Maple Bay by mistake, lost splendid tide in the right direction which we tried hard to overcome, thinking it wd. take us into Gulf of Georgia. Camped at spit S E from the "Penalachut" Village. Pestered by Indians trying to steal, under pretext of trading.

Monday, April 4th

5:00 a.m. embarked, strong tide and light breeze against us. Mr. Tait behaving much like a man mad. 9 a.m. breakfasted hoping tide wd. turn, being short handed for so large a canoe. Found ourselves in Chemainus Inlet, went 2 miles up. When some Indians coming, I shipped a pilot for 1 blanket to prevent further loss of time. 6 p.m. arrived at Nanaimo.

Tuesday, April 5th

Discharged Mr. Tait who was "melancholy mad". Capt. Stewart kindly took charge of him. Wrote to Mr. Pemberton about him and Gabourie, etc., etc.

Wednesday, April 27th

Completed 8700 and measured and posted 1700. Accident to compass - went to Fort to get it repaired. Compared and corrected chain. Bought rope, shrunk and stretched and marked same for measuring across River.

Saturday, April 30th

Completed 202 25 last 10 000 thru prairie. Went to H.M.S. Satelite to get compass repaired.

Monday, May 2nd

Compass finished by Engineer of Satellite. Ret'd to and removed camp 1 1/4 miles further up. Rapids and snags very bad. Fletcher joined.

Tuesday, May 3rd

5:30 a.m. run a line 80 000. Compass working badly in fact incorrectly.

9:00 a.m. after mature deliberation determined on proceeding to Mr. Wells at Cowichan to get needle retouched. 9:30 left camp for this purpose. Bennett left thinking work too hard. 8:30 p.m. encamped at spit near "Penalachut".

Wednesday, May 4th

3:00 p.m. proceeded to Cowichan where we arrived at 10 a.m. Made enquiries for Mr. Wells but could not find him. Went two miles up the River where I got a pilot for a shirt to take to Well's camp, where we arrived at 5 p.m. set compass to rights.

Thursday, May 5th

4:00 a.m. left Mr. Well's camp to return to Nanaimo. 10 a.m. Breakfasted at W side of N. entrance to Stuarts Channel, fine water. Strong ebb tide. 5 p.m. arrived at Nanaimo. Got supplies and proceeded up to Camp where after a severe struggle with the Rapids we arrived 9:30 p.m.

Monday, May 23rd

Completed 23600 about evening, had a council with Indians, gave them a "feed" of bacon and bread and requested them not to remove Posts which they agreed to allow to stand. I referred them to Governor Douglas for payment for their lands or "Tai Mook" which they call the "Deltu Plain". Dollard broke down - not used after this date.

Thursday, May 26th

4:00 a.m. proceeded to Deltu Plains intending to complete survey there. All my Posts were removed by Indians which determined me to waste no more time in planting more.

Thursday, June 2nd

Corrected 16 link error of yesterday and completed 2 miles of Coast Survey. Evening had a splendid observation of Ursa Majoris, really the only decent one yet with the small theodolite.

Friday, June 10th

4:00 a.m. breakfasted and went to Nanaimo paid off Frank and Parkin. Could not settle A/Cs with H.B. Co., they having sent same to Victoria. 11 a.m. left for Victoria. 10:30 p.m. encamped at Maple Bay in Stuarts Channel.

Saturday, June 11th

3:00 a.m. left camp and embarked. 11 a.m. breakfasted at "Tetaihet" Village. No Indians there, tide and wind against us till we arrive at Rose Island 4 p.m. 9:30 arrived at Victoria.

Appendix B
Scale of Fees - 1860

PROPOSED SCALE OF FEES TO BE PAID TO THE SURVEYOR APPOINTED TO THE DISTRICT OF NEW WESTMINSTER BY PERSONS REQUIRING HIS SERVICE.

For defining and picketing one Town Lot complete or any part of the boundary thereof	£1.0.0.
For defining the relative levels of the corners of the same, or of any one of them	£1.0.0
For defining and picketing one Suburban Lot complete or any part of the boundary thereof	£4.0.0
For defining and picketing one Lot of Rural Land complete, or any part of the boundary thereof - the Lot being any quantity up to 100 acres inclusive, at per acre	1.6.
-do- -do- over 100 acres	1.0.
Mileage. For travelling beyond a circle of one mile from the centre of the Market Place, New Westminster, measured in a right line from said centre to nearest corner of Lot to be surveyed - at per mile complete	1.6.

The mileage only to be charged once going from and once returning to New Westminster in each separate case.

Note: Forwarded with Letter 317 to H.E. the Governor 24th April 1860. 25.4.60.

Sig. of R. C. MOODY, Col., R.E. L.W.

Source: "Memo" book of Royal Engineer in "Diaries" tray in Surveyor General Branch vault.

Appendix C
General Survey Instructions

A Notice to Provincial Land Surveyors appeared in the B. C. Gazette of 15th April 1897 which were Order-in-Council rules setting out that all surveys of provincial land were to be made personally by qualified Provincial Land Surveyors. There was also introduced a form of Affidavit which remained unchanged on Provincial surveys until 1970 when the oath in form L of the Land Registry Act was adopted.

The first General Instructions to British Columbia Land Surveyors, for preparation of field notes of surveys made under the Land Act were issued in 1912 by Circular Letter No. 5 - over the signature of G. H. Dawson, Surveyor General. The general tenor was obviously a move to take a firm position to improve the general standard of survey records for neatness and compliance with the Act. The following year two more circulars were issued giving more explicit instructions for conduct of surveys and preparation of returns. 1912 was the year in which the Land Act was amended to include a definition of the duties of the Surveyor General as manager of the surveys of Crown Lands and obviously the incumbent was bent on doing that. No standard of accuracy of "closing" a survey had been official to this year, when the allowable maximum error was introduced into the Act, of 12 links in both latitude and departure for every mile of boundary run. What no doubt had been a practice now became an instruction in that posts set as witness to a corner were to be flattened on two sides only. General instructions for surveys under the Land Act were subsequently issued in 1914, 1918, 1922, 1929 (foreshore only), 1959 and 1970.

Appendix D
E & N Railway Company Survey Rules, 1923

Many surveys in early years were run by compass, especially surveys of Timber Blocks, however since 1923 when the following Instructions were issued all surveys have been independent of the magnetic needle. The complete Instructions are repeated here for historical purposes as it is difficult to obtain a copy.

LAND DEPARTMENT, E. & N. RAILWAY COMPANY

Instructions to Land Surveyors

All surveys shall be tied to the boundary of some area previously surveyed.

All lines shall be run to the cardinal points of the compass, and the magnetic variation used shall be noted in the Field Book, and no jog shall be less than twenty chains in length. Lines of over twenty chains in length shall be run in multiples of five chains.

Transits, theodolites, or other instruments, independent of the magnetic needle, must be used in running lines, unless otherwise arranged with the Company.

Posts shall not be less than four inches square, four feet out of the ground, and scribed with the number of the Lot or Block, and shall be numbered consecutively from the initial post.

All posts shall be squared two feet from the top, pointed at the top to shed the water, and securely placed in the ground where practicable. Pieces of charcoal or marked stones shall be placed under each post, and the fact noted in the Field Book.

On rocks or where it is impossible to sink posts, they shall be surrounded by a cairn of rocks at least thirty inches high, base to be three feet square.

Three bearing trees shall be taken for every post, the trees being marked B. T., with distance from post, and faced towards the post; where no bearing trees are available, the fact shall be noted in the Field Book. The lines through timber shall be thoroughly blazed, the blaze to be made on each tree, quartering on the line, so as to be easily distinguished and traced.

No tree shall be blazed at a greater distance than six feet on either side of the line.

All line trees shall be notched with three notches on each side in the direction of the line, and their size, kind of timber, and distance from the last post, shall be given in the Field Notes.

In completing the survey, no gore or broken parcels of land shall remain between the parcels being surveyed and the boundaries of any land previously surveyed.

Field Books must be ruled up the centre of the page to represent the line that is being run, and the notes kept from the bottom towards the top, with sketches on each side. On each page must be given the number of Lot or Block, and the bearing of the line (true or magnetic) and the direction in which it has been run, and state if the line was run by compass or transit, etc.

The first entry in the Field Book each morning shall be the date. The Surveyor shall make full notes as he proceeds of the character of the country, nature of the soil, lakes, timber, etc., on both sides of the line.

One fair copy written in ink shall be sent to the E. & N. Land Agent as soon as practicable after the completion of the survey. The acreage must be written in pencil on the plan and in the Field Book.

Plans must be plotted on a scale that will comply with the Land Registry Act in force at the date of survey, showing all the information contained in the notes, with number of page in the Field Book, written on each line, and a tracing on linen sent with, but not pasted in, the Field Book.

Three typed copies on plain paper of descriptions by metes and bounds are to be provided by the Surveyor, together with three additional tracings on linen, one blue print on linen and one paper blue print (to be retained by the Land Registry Office) for the purpose of conveying the land.

All plans and descriptions to bear the official approval of the Land Registry Office.

The chaining must be as correct as possible, and the chain frequently tested by a standard measure.

All streams or rivers that are crossed shall be noted, also their width, volume and direction.

Bearings, and distances to bearing trees, shall be carefully noted, also the kind of timber, and the size of the trees.

All roads and trails, with the directions whence and whither, shall be carefully noted.

The Field Books shall be in the form supplied by the Government, and the "General Instructions" (except as to clauses 4, 5 and 16) therein shall be carefully followed.

The Field Notes and plans must be sworn to as correct (as per Form L of the Land Registry Act) by the Surveyor before a Notary, prior to their acceptance by the Land Act.

Plans for deeds must be certified as per Form L, Land Registry Act.

Surveyors must obtain a copy of these instructions, which will govern their work, and should apply for Lot or Block numbers to the Land Office to described the lands surveyed before taking the Field.

The Railway Company reserves the right to change or modify these regulations at any time without notice.

Victoria, B. C.,
July, 1923.

L. H. SOLLY,
Land Agent.

Appendix E
Posting - Crown Land Surveys

Prior to 1879, the two published Manuals of Survey available to surveyors working in British Columbia which contained any worthwhile descriptions on marking of survey corners were the United States instructions to regulate the field operations of deputy surveyors, (15) dated 1855 and the Manual of Survey of Public Lands in Manitoba and the Northwest Territories dated 1871.

In the 1855 U. S. manual, section and half-section posts were to be of wood - two feet into the ground - squared above ground with 3-inch faces and a system of notching the corners of the posts according to their distance from the Township corners was laid down. Three bearing trees were to be made, notched and carved with range, township and section number. In lieu of Bearing Trees, "quadrangular" trenches were called for. In addition to charcoal or marked stones which were to be planted beneath the pits as "memorials" it was recommended that seeds of a tree - preferably fruit trees - be planted and in the course of time if noted in the field book, would become a record of the post location.

In the "Manitoba" manual a complicated list of alternatives was given for prairie country, timber country or where "stone abounds". Wooden posts in timber country were squared and pointed to shed rain and bearing trees recorded. In prairie country large mounds and trenches were needed but a post was always set in the centre of the mound. Where "stone abounds" a corner could be a single stone referenced by bearing trees if possible. On certain Township corners 1 3/8" square iron bars, 5 feet long and pointed at the end for driving were required to be set.

In 1879, the Crown Lands Amendment Act instituted standards of posting in British Columbia which appear in detail in the Section entitled Sixth System - Provincial Townships, of this text. With small variations as for the "flattening on two sides" of witness posts initiated in 1912 the 1879 specifications remained in effect until 1947 (52 years) when the Standard Pipe Post (iron type filled with concrete) was introduced (see B.C. Gazette, May 1st, 1947). From 1951 to 1974 these pipe posts have been made in various metals, i.e. iron pipe filled with concrete with a brass cap on top with an iron flange on the bottom, aluminum pipe with aluminum cap and base, copper pipe with brass cap and brass base, and a two-piece driveable type consisting of an outer copper pipe with brass cap and an inner iron pipe with brass spear point which is driven first. The capped iron post which is a present alternative to the pipe post consists of an aluminum washer through which a half-inch-square galvanized iron bar with an expanded head is driven.

Appendix F
Posting - Dominion Land Surveys

Railway Belt and Peace River Block Surveys under Dominion Instructions

It appears that between 1871 and 1917 there were 10 editions of the Dominion Manual. A synopsis of post types was made in 1917 by H. L. Seymour, D.L.S. and published in a hard cover book of 29 pages entitled "Description of Boundary Monuments Erected on Surveys of Dominion Lands, 1871 - 1917."

Anyone wishing details of the requirements for posting at a particular year should see this book(28) but a quote of one paragraph of the preface to the book is illuminating and denotes a practical awareness of the difficulties of communication and procurement:

> *"There are some clauses of the various editions of the Manual relating to monuments that appear open to more than one interpretation. From old correspondence on file it would also appear that surveyors in the field were not always cognizant of changes in instructions relating to posts, or were not always in a position to follow out their instructions. There can therefore be no guarantee that a surveyor has closely followed his manual or the general instructions as outlined in the annual reports referred to. In some cases the surveyor's field notes show he did not. Furthermore it has occasionally been found that the monuments on the ground are not as shown in the notes."*

Appendix G
Posting - Land Registry Act Surveys

The first record of specified post types for surveys under the Land Registry Act appeared in the British Columbia Gazette of June 24th, 1943. This is where the 1/2-inch-square iron (BCLS) bar was introduced. Of course it should be realized that this was during the Second World War and with the great shortages of metals it was difficult if not impossible for surveyors to obtain posts to this specification. Old spikes, rods, pipes, angle irons, axles, etc., which had been used previously by some surveyors continued to be used for a few years more. Between 1951 and 1959 a 3/4-inch angle iron was allowed in lieu of the 1/2-inch bar. In 1956 an aluminum 1/2-inch-square bar was introduced as an alternative to iron. In 1959 the angle iron was disallowed.

Appendix H
Posting - Mineral Act Surveys

The first record of specified post types for surveys under the Mineral Act of British Columbia appeared in Instructions by the Surveyor-General in 1899. The post used was the same as in Land Act surveys, i.e. 4"-square wood, 4' out of the ground and pointed at the top to shed water. It was not until 1926 that iron posts were introduced. The long post was a 1-inch angle iron, 30 inches long and the short post was a 3/4-inch-diameter soft bar 10 inches long, squared for the top 6 inches and set in a hole drilled to a depth of 4 inches in bedrock and secured in place with a steel wedge in a split in the bottom of the post. A wooded post of legal size, i.e. 4 inches square, etc. was to be planted alongside the iron post - with cairns of stones and Bearing Trees as in the Land Act surveys.

From 1926 to 1959 there was no change in posting Mineral Claim Surveys. In 1959 posting was again brought in line with Land Act requirements (as it was between 1899 and 1926) for survey of small areas and the Type 5 (1/2-inch-square, 30-inch-long) standard bar post was authorized for Mineral Claim Surveys. In 1970 the General Instruction Manual was amended and from then until the present, various types of monuments, including concrete monuments, rock posts, pipe posts and standard bar posts are required on control, perimeter and single claim surveys. (B.C. Reg. 99/70)

Appendix I
Official Map Acts

From time to time various original surveys have had to be resurveyed and replaced by new surveys and various Railway Land surveys have had to be confirmed. This has been done by Statute. It is prudent however to realize that where Crown Grant tracings were attached to a Grant that preceded in time the confirmation of the new Official Plan, these original attached plans are not the confirmed plan. An index to Official Map Acts is listed here.

These are not surveys under the Special Surveys Act.

Townsites

Alberni (1909) Misc. Acts 1913 p. 889 - An Act Respecting the Official Map of Alberni Townsite.

Nanaimo (1895) Misc. Acts 1913 p. 615 - An Act to make Valid and Binding an Official Map of the Survey of the City of Nanaimo.

New Westminster (1880) Misc. Acts 1913 p. 401 - An Act respecting the Official Map of the City of New Westminster.

Victoria (1893) Misc. Acts 1913, pp. 405, 412, 414, 486, 502, 582 - An Act Respecting the Official Map of the City of Victoria, and Subdivisions of Lands within the Boundaries of the said City. (Amended 1913 - Chapter 79).

Districts

Bulkley Valley (1908) Misc. Acts of 1913 p. 1000 - An Act Respecting the Official Maps of Bulkley Valley, Townships 1A, 2A, 3, 4, 5, 6, 7, 8 and 9 Range 5 Coast District (amended in 1914 - Chapter 7).

Comiaken (1903) Misc. Acts of 1913 p. 775 - An Act Respecting the Official Map of a Portion of Comiaken District.

Quamichan (1894) Misc. Acts of 1913 p. 596 - An Act Respecting the Official Map of Quamichan District.

Railway Lands

Timber Permits, Blocks and Tie Reserves - Kootenay District.

1912 - Chapter 37 S.B.C. - An Act Respecting the Re-purchase by the Crown of certain Railway Subsidy Lands (B.C. Southern Railway and Columbia and Western Railway.)

1920 - Chapter 75 S.B.C. - An Act for Defining Certain Lands Granted to the British Columbia Southern Railway Company and to the Columbia and Western Railway Company.

1926/27 - Chapter 57 S.B.C. - An Act to confirm Surveys Relating to Railway Subsidy Lands Re-purchased by the Crown.

Appendix J
Lineal and Square Measure

The following explanation of lineal and square measure is taken from a treatise on surveying instruments published in London 1850, now in the Provincial Archives (North West Collection) and bears the identification of the handwriting of Col. Moody:

The Land Chain

Gunter's Chain is the one now commonly used in taking the dimensions of land; it is sixty-six feet, or four poles, in length, and is divided into 100 links, each of which is joined to the next by three rings: the length of each link, including the connecting rings, is 7.92 inches, and at the end of every tenth link is attached a piece of brass (each of a different shape), for more readily counting the odd links.

'The English acre contains 4840 square yards, and Gunter's chain is 22 yards in length, and the square chain, or 22 multiplied by 22, given 484, exactly the tenth part of an acre; and ten square chains are equal to one acre: consequently, as the chain is divided into 100 links, every superficial chain contains 100 multiplied by 100, that is 10,000 square links; and 10 superficial chains, or one acre, contain 100,000 square links.

'If therefore the content of a field, cast up in square links, be divided by 100,000, or (which is the same thing), if from the content we cut off the last five figures the remaining figures towards the left hand given the content in acres, and consequently the number of acres at first sight; the remaining decimal fraction, multiplied by 4, gives the roods, and the decimal part of this last product, multiplied by 40 gives the poles of perches.'